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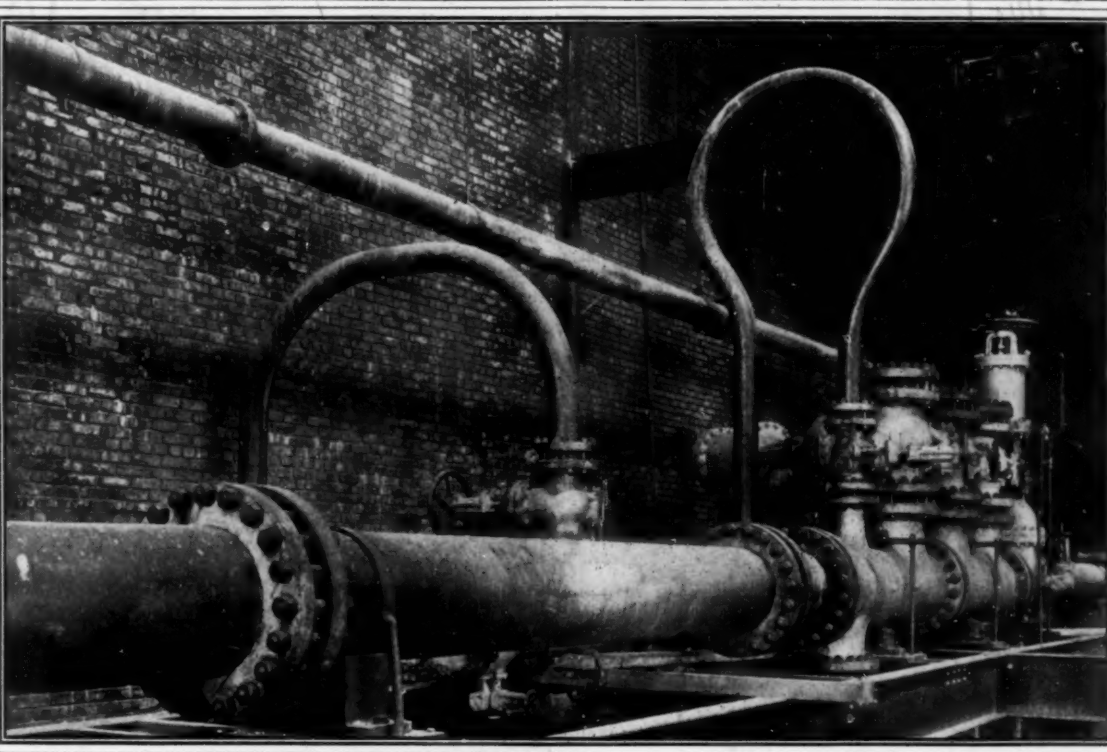

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CHEMICAL & METALLURGICAL ENGINEERING

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H. C. PARMELEE, Editor

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Canada Wields A Big Stick

IT IS a poor game at which two cannot play. Our friend and neighbor Canada is evidencing shrewd recognition of that fact in her legislation with regard to an embargo on pulpwood. On June 26 a bill was passed by the Canadian Parliament permitting the Governor-General at his discretion to restrict the exportation of this most essential commodity in paper fabrication. Should the Governor-General decide to make use of the authority vested in him, there can be little doubt that many of the pulp and paper mills in the United States would be hard hit. Although only about 20 per cent of our supply of pulpwood comes from across the border, still to remove this source would result in serious difficulties for our industry. The price of pulp would inevitably soar. Consequently a committee representing the parties interested in this country is working hard to persuade Canada not to put the embargo into effect.

It is illuminating, however, to look at the matter from the Canadian viewpoint. Canada did not appreciate the hand we dealt her in our little tariff game. Being essentially an agricultural country, our duties on grain and linseed constituted a real blow to her trade. The inclusion of several mineral resources as well as certain manufactured chemicals in the list of those articles which were heavily dutiable did not soften the effects of that blow. Moreover, it is quite evident that our Canadian friends have not failed to appreciate their practical dependence upon us for such essential materials as anthracite, hardwood and cotton. So it was natural that they seized upon their forest resources as the card necessary to strengthen their hand in the game of international trade. The pretext for this act is entirely plausible. Why allow the natural resources of the country to be used in manufacturing outside the provinces? If outsiders wish to use these supplies of pulpwood, why not build factories at the source where Canadian workmen and tradesmen might profit by the industry? Such questions as these are indisputably legitimate. The practical considerations involved, however, are such that for the average small firm in this country, hardship or ruin would almost certainly be met in order to transfer its mills across the border.

The old adage about not attempting to cross a bridge before one comes to it seems to apply very well here. As matters stand, this proposed embargo is Canada's own domestic affair. Our industries cannot well take any action until it is known what Canada intends to do. And before Canada does anything further a thorough investigation of the entire situation from every possible angle is to be made by a specially appointed Royal Commission. In the course of this investigation a hearing will be held at which the interests of our industries will be considered. It is quite likely if not inevitable that as a consequence of the findings of this commission the Governor-General will be advised not to put the bill into effect. In the meantime, however, this is not a matter of quite such serious concern as some of our friends make it out to be. Canada has her ace in the hole, certainly; yet after all the chances of playing it are comparatively slight.

High-Speed Statistical Service

INDUSTRY'S long-standing plaint about the proverbial lethargy of the government statistical service bids fair to be dissipated by recent developments in the Department of Commerce. Notwithstanding an additional burden placed on the Bureau of Foreign and Domestic Commerce by the elaborate classifications of import and export figures and the detailed revisions necessitated by the Fordney-McCumber tariff, some remarkable records of accomplishment have just been reported.

The statistics of imports during May were issued simultaneously with the export report on June 20. It is now announced that the preliminary totals are to be ready by the thirteenth of the month and that a week later the detail by articles and countries will be available in photostatic form. And the final analysis by grand divisions and countries will be ready within the second fortnight.

Even the Government Printer is to be speeded up to expedite publication of the printed statistics. This is really the neck of the bottle that in the past has often put us at a disadvantage in comparison with the well-known expedition in handling British trade figures. In England the printing is done by a private firm working in close co-operation with the foreign trade statisticians. Unfortunately our own government printing establishment, although one of the most efficiently organized institutions of its kind in the world, must continue to cater to political favor. The *Congressional Record* must have its priority even if industry has to wait for its statistics.

The detailed compilation of the imports of dyes and chemicals direct from the consular invoices was inaugurated by the Tariff Commission and later carried out on a monthly basis through the joint work of the commission and the Chemical Division of the Bureau

of Foreign and Domestic Commerce. These reports soon demonstrated their usefulness, which is now recognized in the announcement that a special statistical service will continue to make these data available immediately to the producing and consuming industries.

These are the evidences of the wide-awake statistical activities of the Department of Commerce. A sincere effort is being made to meet the crying needs of industry and it is pleasant to record that in spite of physical obstacles and a tremendously expanded program, the department is now setting records of dispatch that entirely outdistance past performances of either governmental or private statistical agencies.

Political Chicanery And the Farmer's Welfare

ALL but a stupid and limited few of the ultra-reactionary politicians admit that the welfare of the agricultural community as a whole is essential to the welfare of manufacturers and distributors of all kinds of commodities. There can be no doubt that the agricultural interests of the country have suffered seriously in the past few years and that they deserve every sort of support that ingenuity can devise for amelioration of their unfortunate financial straits. But any such effort should be directed along sound economic lines, for real service to the agricultural interests, and not consist simply of impossible promises and political chicanery typical of the demagogue.

There are three well-recognized needs of the farmers which are only in part satisfied by recent legislation and governmental effort. These needs are:

(*a*) Assistance in the most efficient methods of farm production—namely, through research, educational work and crop information service;

(*b*) Equitable and efficient financial assistance to permit marketing of crops without excessive commissions and without the necessity of losses through forced sales; and

(*c*) The control of the speculative element in farm products which creates artificial "shortages" and "surpluses" in the interest of the speculator and to the harm of the producer.

The Department of Agriculture is affording to the maximum degree that its appropriations permit the service needed for the education of the farmer. But many of the farmers are not good raw material on which to work; many are incompetent to conduct successfully so difficult a business as is involved in modern agriculture. The elimination of these is the inevitable economic consequence of competition. It is quite as necessary to get rid of the incompetents as it is to aid those who give promise of real success under proper conditions.

The farm credit legislation of the last Congress has done much to afford relief in the financial aspects of farm business. One of the most eminent authorities on economic conditions in the United States says that a reduction in agricultural credit charges from 8 per cent to 6 per cent would be of more benefit to the farmer than a 20 per cent reduction in freight rates. There are many who would take issue with this conclusion, but certainly the authority is so high as to entitle it to more than passing notice. We are inclined to commend it to Senator LaFollette and his weird aggregation of associates in the farm-labor bloc who are now making so much commotion about freight rates. Doubtless a rate reduction, if it can be accomplished without a paralysis of our transportation system, would be helpful to the agricultural community. The prospects for any considerable relief in this direction, however, are noticeably slight and real advancement must come through improvement in marketing and credit conditions.

The price of farm products seldom advances as rapidly as the prices of commodities the farmer must buy; and the first commodities to fall in price on a downward swing of the markets are the farm products. Naturally the producer suffers. But these are economic facts which it seems almost impossible to change by any amount of legislation or political haranguing. However, it should be entirely feasible to eliminate that parasitic leech of grain and produce markets who plays as "bear" or "bull" in the speculative handling of agricultural products. He serves absolutely no useful purpose to the community. The principal effect is the development of additional dissatisfaction and the stimulation of political and economic discontent.

By this comment, however, one must not understand any condemnation of the legitimate trading in grain or produce for immediate or future delivery. Operated on a proper basis, exchanges dealing in these commodities serve real purposes and in the long run aid in bringing buyer and seller together to their mutual advantage.

Let the Farm Bureau Federation, the farm bloc in Congress and others who have real brains at their command study these problems with the recognition that there are economic laws that cannot be amended or replaced at the legislative whim. The result would be most profitable to the farmers and incidentally would help them regain the confidence and support of the manufacturing and commercial interests.

Standardized vs. Individualistic Educational Methods

LATELY our distinguished contemporary the *Chemical Trade Journal* and *Chemical Engineer* of London has had the following to say regarding British universities:

> Sir J. J. Thomson, presiding at the annual meeting of the Institute of Physics on Wednesday, gave an account of what he had seen on his recent visit to America with regard to the application of science to industry, and incidentally paid a high tribute to the value of the British system of university and secondary education. Whilst he was impressed by the large research institutions connected with industrial corporations in America, and felt that their commercial and scientific possibilities were enormous, he was convinced that the American universities do not produce first-class research workers, or men exceptionally fitted for the direction of research, in anything approaching the proportion that British universities do.

Sir Joseph is Master of Trinity College at Cambridge, and he is very familiar with their traditions and habits of study. We do not carry the traditional chip on our shoulder in relation to all things American, and rather than contradict so eminent an authority, we sought an Oxford man, a Rhodes Scholar, born in the Middle West, educated at a Western college in the United States, then at Oxford and finally taking his Ph.D. degree at one of the leading Eastern universities in

this country. He is just as much an American as ever he was in thought, in speech and in sentiment; and he is eminent in research. What follows is the substance of his answers to our questions. Compared with American methods of education, Oxford and Cambridge, although lively rivals, are essentially alike.

If one wants information pounded into young people, he regarded the American system as supreme. American instructors are driven to keep their students from wasting time and they must, therefore, be put upon the right track. To this end, everything is thought out for them in advance, so that they have, in effect, but one path to take. The American student's work is all cut out for him; allotted to him rather than chosen by himself. Even a man working at his Doctor's degree is likely to be too busy to think originally. The outstanding characteristic of American-trained students which is frequently observed in Great Britain is his worship of text books; his disposition to regard them as gospel.

At Oxford they would rather have you develop an ingenious theory that is wrong than to quote a correct theory from the books. An American professor does not ask, "What are you going to do this term, Mr. Studiosus?" But at Oxford this is even habitual. Their method is to turn a man out into a field and let him find his work. If he can't find anything there to engage his interest, nobody minds; the instructors address themselves to those that can. Their whole purpose is to induce young men to educate themselves. Fundamentals must, of course, be known, but after that one chooses his own course. The British system offers privileges and leisure which in America are lacking. But leisure has a qualified significance. Vacations are as important as term time, and students work during vacations. They read voluminously and are supposed to think things out quietly and calmly. One may attend lectures diligently or not, as he pleases; it has no bearing on his standing. Examinations will tell. The purpose of it all is that the student shall learn to digest mentally what he has learned rather than that he be fed. As Dr. Aydelotte says in his interesting article on Rhodes Scholars in the June number of *Scribner's Magazine* for this year, one "must have the will to take, he must know what he wants, and he must have the good manners not to grab."

At examinations the effort is made to find out what the young man knows and not to trip him up on what he doesn't know. They are severe, but they have to do with the philosophy of the subject and with outstanding facts relating to it rather than with statistics. It is impossible to cram for them, for they are too searching. And no student is ever examined by his own instructors. It is held that this would not be fair. In regard to the severity of examinations we may quote Dr. Aydelotte again: "The English idea of first-class honors is that they should be obtainable only by a man of first-class ability who has done the hardest and best work of which he is capable." These highest honors are not supposed to be within the reach of the average man no matter how hard he works.

The apparent lack of system and the leisurely method of working are usually disturbing to the American student during his first 6 months. It is therefore seldom profitable for a young American to go to an English university for a single year, except for special advanced work, because it takes considerable time for him to find himself; to develop his academic initiative. The benefits of this appear in his second year.

While for men of exceptional genius the form of educational system is immaterial, the opinion of our experienced friend is that the American system excels peculiarly in equipping the average man—the rank and file—with standardized technical or professional information. But in stimulating the highest order of independent and scholarly attainment in men of better than average talent, there is much to be said for the more flexible and individualistic character of the British system.

Loeb Collection Of Chemical Types

CHEMICAL RESEARCH, so far as it is embodied in written articles, is usually very well preserved in publications. On the other hand, the material results of research, such as samples of new and valuable substances, are frequently lost or destroyed. Even when they are preserved, they are often so dispersed and difficult to locate that they are almost useless to the profession at large.

It seemed to Prof. Morris Loeb, the eminent chemist who died on Oct. 8, 1912, that this condition was greatly to be deplored and that the collection and preservation of the material fruits of research could be made of assistance to research chemists. Professor Loeb therefore left a bequest of $25,000 to the American Chemical Society, to be held as a special fund, the income of which should be used for the establishment or maintenance of a chemical type museum. The chief object of the museum was to be the preservation of all new substances described as the result of chemical research, by obtaining these products as gifts, purchasing them from the discoverer or causing them to be prepared in sufficient quantity according to the discoverer's published directions; all this is for the purpose of facilitating comparison by subsequent observers.

By means of the income from the Morris Loeb fund, the Smithsonian Institution in Washington has laid the foundation in the National Museum of "The Loeb Collection of Chemical Types." The control or ownership of the specimens is placed in the Institution rather than the Museum to avoid the usual governmental restrictions as to sale and other disposal of materials and to permit the carrying out of the intent of Dr. Loeb in regard to the use of the collection.

This is a project well worthly of the support of the chemical engineering industries. We commend it most heartily to those who work in the realms of scientific and industrial research. Their sympathetic co-operation would be of genuine service to science, to industry and to our profession.

A subscriber in a Middle Western university writes to tell us he has given up the study of chemistry. He justifies his course as follows: "I have found that (1) it takes hard study to learn chemistry, (2) and then, after you have finished the course, it is hard to find a position, and (3) this position is likely to be badly paid." His discovery of reason No. 1 is sufficient to warrant our congratulations both to him and to the profession he has spurned.

Two Perplexing Problems American Dyes—German Reparation

A Distinguished Leader in Chemical Industry Probes the Present Status of These Problems With Deftness and Vision

THERE is undoubtedly less cause for pessimism in the chemical industry today than there was 2 years ago. Yet the tangles of the present, while possibly less difficult and perplexing than have been those in the past, still demand serious attention. Vital questions must be faced, especially with regard to international relations. Therefore it is well to take serious account of stock.

At such a time it is a rare privilege to talk with a clear-thinking executive whose vigorous remarks, tempered by long study and sound judgment, carry conviction. Such a man is Elon Hooker, founder and president of the Hooker Electrochemical Co., and president of the Manufacturing Chemists' Association. Mr. Hooker has made a thorough analysis of the outstanding questions that the chemical industry faces today. Perhaps his methods as well as his utterances are molded somewhat by his long personal acquaintance with Theodore Roosevelt, whose photograph hangs over his desk. At any rate his philosophy has as its keynote "America for Americans."

Elon H. Hooker

President of the Hooker Electrochemical Co. and of the Manufacturing Chemists' Association—An engineer — An executive — A citizen.

"The building up of our dyestuffs industry continues to be, as it has been in the past, our most vital problem in preparing inexpensively for the national defence here at home. Because this has been my belief I have been fighting as a plain American to build up a dyestuffs industry in this country. As chairman of the American Defence Society I have sought to do all in my power to demonstrate the vital necessity of encouraging the growth of this industry.

"And on the other hand as a business man I have been tempted again and again to go into the dye game myself. Just as often I have been forced through hard reasoning to turn the idea down. It has not been a seductive proposition. The big firms already in it are not facing bright business prospects. A company that enters the dyestuffs field must not be hampered. Rather it should be given every opportunity to make good. All the money that might possibly be made should be allowed these firms. They are benefactors of the nation at large, because in the event of war not only would they be a tremendous factor in spelling success or failure, but financially their plants would make for the country huge savings. As president of the Manufacturing Chemists' Association you may be sure I shall continue to exert myself in the cause of this tremendously important industry.

"When dyes are mentioned one instinctively thinks of the related though larger problem of reparations. They affect our industry vitally as they do all other industry here and in England and France. I have recently been in Europe looking over the situation in the Ruhr, getting the German as well as the French and English points of view on reparations and endeavoring to discover what effect the possible outcome of the tangle existing there may have on us here in America.

"For the industrial safety of England and the United States, and for the military safety of France, Germany must be forced to pay from her surplus and current receipts heavily and for a long period of years. Otherwise the commercial advantage of operating without overhead which she will have will constitute an insuperable barrier to possible competition or durable peace.

"If Germany with 60,000,000 people taxes herself at the present rate of French taxes on France's 40,000,000 people, Germany will have a present income of 33,000 000,000 French francs yearly, as against France's present 22,000,000,000 francs. France has given three-quarters of this income to her army, her navy and her internal debt. Under the Versailles treaty, Germany can have no army, no navy and her internal debt and the bonded indebtedness of her industrial plants is wiped out by the fall of the mark from four to one hundred thousand to the dollar. Germany, therefore, can devote three-quarters of her 33,000,000,000 French francs, or $2,500,000,900 per year, to payment of reparations. This amount would discharge the $39,000,000,000 the Germans expected to pay when they made the conditional offer of $25,000,000,000 or more at the time of the Versailles treaty, or the $33,000,000,000 fixed by the Reparations Commission a year later—any of them within the periods of 17 to 26 years. These periods are all too short for proper safety and even these will be anticipated. The funding of the British war debt to us will result in a charge on the British people for 62 years, and there is no reason why the duration of the burden on Germany should be any shorter.

"Our entrance into a World Court entirely disassociated from the League of Nations and co-operation with the League in matters of world social service will be our sufficient association with foreign nations for some years to come. It is high time we looked after our own affairs at home and built up here a renewed and robust national spirit, taking a leaf from Mussolini's book, and gave less thought to a species of invertebrate internationalism."

Some Features of

Design and Operation In a Modern Fertilizer Plant

The Enormous Acid Phosphate Plant of the Davison Chemical Co. at Curtis Bay, Md., Is Described From the Standpoint of Engineering Design and of Operating Technique

BY CHARLES WADSWORTH, 3D
Assistant Editor, *Chem. & Met.*

UNLESS we first consider the specific economic conditions that affect the individual corporation we are sure to miss the basis upon which much of the technology is built. For example, if we didn't know that the Standard Oil Co. piped its crude oil from the field to the refinery, we might be mystified at the comparatively small number of crude oil tank cars at the refinery. The point hardly needs enlarging, but it will justify the following brief consideration of the background and economics underlying the Davison Chemical Co. The plant is situated on Curtis Bay, Maryland, not far from the center of Baltimore shipping. Ocean-going steamers can dock with facility at either of two piers equipped with most modern loading and unloading devices. Its principal product is acid phosphate (the mixture of sulphuric acid and phosphate rock used as a basis for most mixed fertilizer). The plant has the tremendous capacity of 1,200 to 1,400 tons of product per day, in addition to which all the sulphuric acid used in the manufacture of acid phosphate as well as about 20 per cent excess that is sold is produced at this plant. During one month there was a movement of 120,000 tons, including production and shipments. That means size and consequently presages a careful, scientific laying out of material handling equipment.

CHEMICAL ENGINEERING IN INDUSTRY

The acid is made from Spanish pyrites at present, although the company owns a fully equipped pyrites mine in Cuba which would make it independent of foreign pyrites at a moment's notice. Naturally this serves as a first-class economic lever in negotiating pyrites contracts. Another raw material, phosphate rock, comes largely from Florida. Both this material and the pyrites are unloaded from steamers as described in detail later on.

As the facts begin to accumulate it is readily understood that the problems of material handling loom very large in this plant. For every ton of acid made a ton of pyrites must be unloaded, moved to storage bins and from there to the burners. In addition two-thirds of a ton of cinder or burned ore must be handled from the burner discharge to the bins and then to barges. The cinder is shipped to both copper refineries and blast furnaces, the former extracting the copper and the latter the iron. The Davison company purchases only the sulphur content of the ore.

So far we are only half way through the plant. Phosphate rock must be moved from the ship to the storage bins, from the bins to the mill feed, from the mill discharge to the mixer. Then the acid phosphate must be taken out of the dens which are below the mixer, moved to the storage piles and then moved again for shipment. A ton of rock phosphate produces roughly

FIG. 1—UNLOADING PYRITES FROM SHIP TO DOCK
Showing the outriggers over the ship and a near view of the monorail cranes.

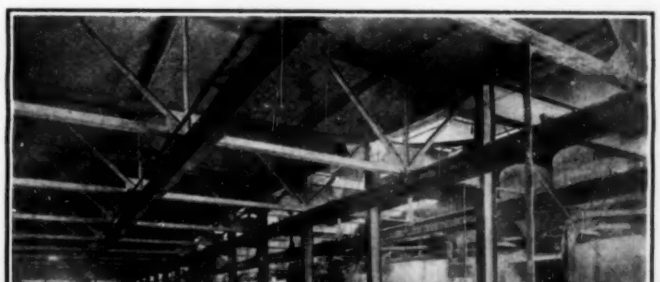
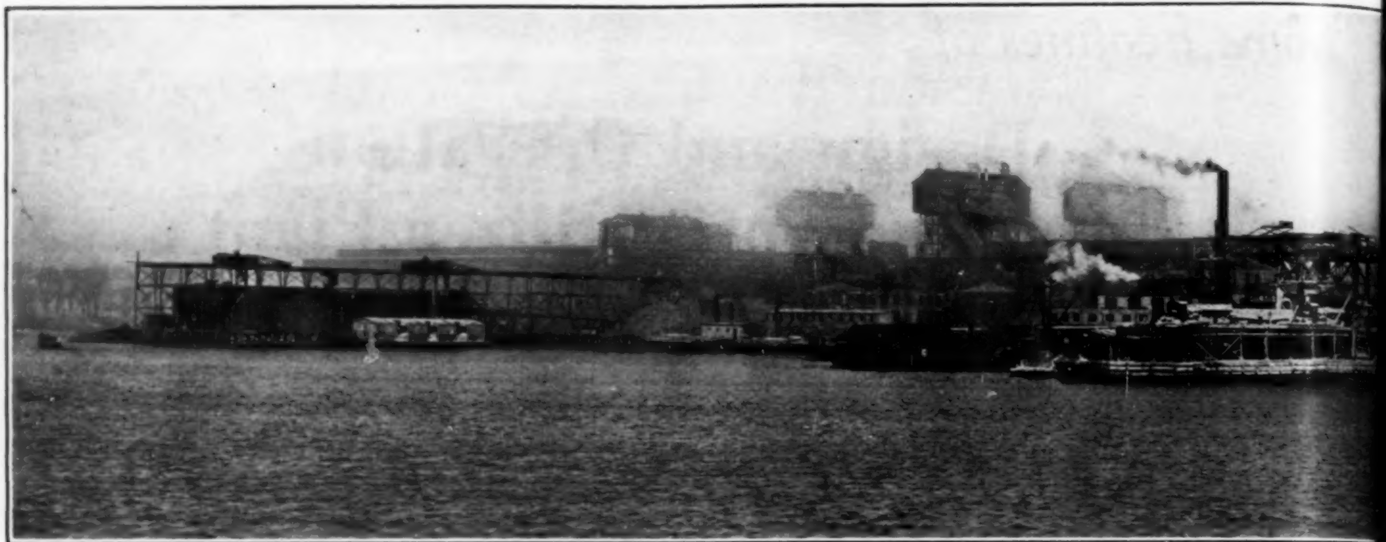


FIG. 2—ORE-STORAGE BINS
Showing monorail and dump buckets, with Wedge ore burners in background.



2 tons of acid phosphate and both of these are solid materials which cannot be pumped. That is a large part of the technical problem in the design and layout of the plant.

In addition there is the trifling operating problem of producing 1,200 tons of finished product. To produce a thousand tons of anything would, we submit, present operating problems of the first magnitude. Acid phosphate has specifications that are definite, and this makes operating control more detailed and more exacting than in the case of many products where the output is measured in pounds, not hundreds of tons.

Space will obviously not permit us to do more than mention the high spots of design and operation, and we shall begin with the sulphuric acid plant. As already mentioned, the raw material is Spanish pyrites (iron sulphide) received in steamers and unloaded to storage bins. The ore is burned to sulphur dioxide and cinder. The former is transformed into sulphuric acid in a system of chamber plants and the latter is returned to storage and loaded into barges for shipment. From this primer outline three main problems present themselves for study—first, the handling of pyrites and cinder; second, the burning of pyrites, and third, the chamber systems themselves.

Perhaps the most striking thing about the Davison Chemical Co.'s plant is the fact that the whole plant is planned. So often in the chemical industry you run into factories that just grew, so often the engineers have been hard put to it to make the most of a bad job, that it is a genuine pleasure to go through a plant where the layout has been the subject of deliberation and thought before the plant was built. The system for handling pyrites is a good example of this. The same system unloads the ships at the dock and conveys the material to storage. It then moves the ore to the burners and removes the cinders from the burner discharge first to a temporary storage and then to barges for shipment. The system is rather a novelty to the average chemical engineer, as there are relatively few of them in use and none that the writer has ever inspected. It is a monorail system and consists essentially of 15-in. I-beams suspended at the proper height. On the bottom-flange of this I-beam runs the trolley from which hangs the operator's carriage and the hoisting and running equipment. The accompanying photographs, Figs. 1, 2 and 4, show clearly the manner of construction of the supporting framework and the method of hanging and operating the cranes and buckets. To one side of the rail can be seen the wire which carries the driving current and with which the arms of the crane make a sliding contact. The cranes develop about 50 hp., and the current is 230 d.c. The system was laid out by the engineers of the Davison company together with the Sprague Electric Co., which supplied the equipment. It has a number of advantages, not the least of which is the elimination of a large amount of surface traffic in a large plant. Its limitations are largely limitations in design—that is to say, it can be used to advantage only where the plant is relatively compact and where the points it must reach can be adequately covered from a few lines of track. The monorail system has very little sidewise flexibility. One of the grab buckets can be pulled out of the perpendicular perhaps 20 deg. conveniently, but this does not mean a very wide range in a drop of 20 ft. It means that the storage bins must be long and narrow and the diagram shows that they are. This sidewise flexibility is entirely sufficient applied to the unloading of ships where the drop from the outriggers to the hold of the ship will be at least 40 ft.

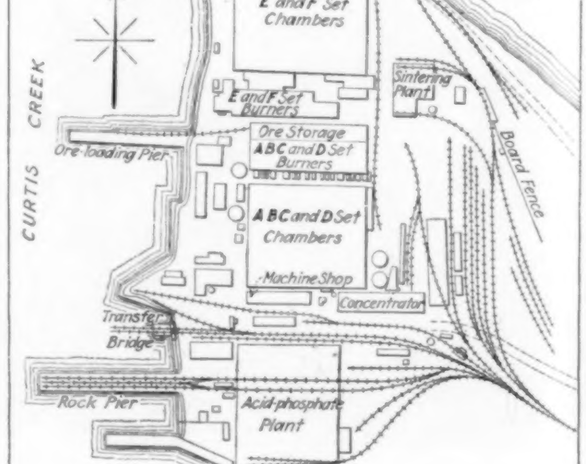
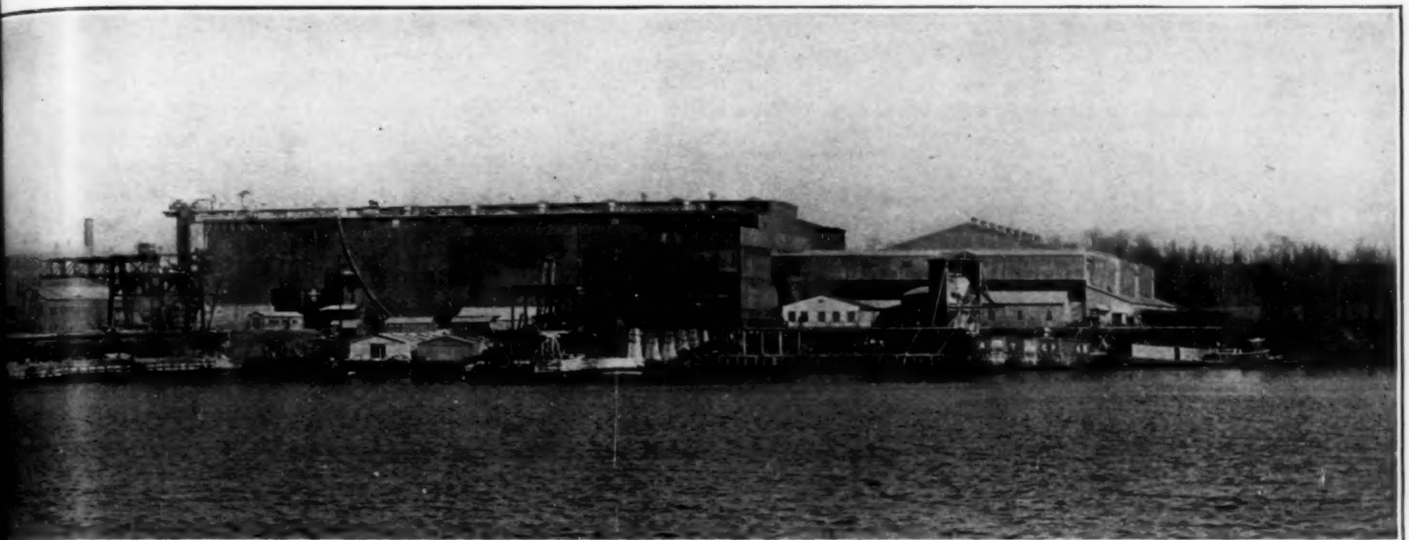


FIG. 3—PLANT LAYOUT



So much for what it is and how it works. It is about time we discussed to some extent what it does. The photograph (Fig. 1) shows the pyrites-unloading dock and the outriggers lowered over the hold of the ship and raised on the opposite side of the dock so as to be entirely out of the way of the ship rigging when it arrives or leaves. The clamshell buckets are operated from these outriggers and they in turn fill strings of dump buckets with the ore. These are then drawn into the storage bin and dumped. This system keeps the clamshells busy withdrawing the ore from the ship. It is possible with this system to unload a ship containing 6,000 tons of ore in 3½ days.

The ore-storage bins are under the same roof as the cinder storage (see Fig. 2). They are both concrete bins, the latter having a bottom discharge which makes for flexibility in operation. There is capacity for 22,000 tons of ore and 7,500 tons of cinder in storage at one time. The next step is the moving of the ore to the burner feed hoppers. The ore is picked up by monorail grab buckets from the storage pile and is dropped into a hopper, from which the dump buckets are loaded. These monorail dump buckets distribute the ore to the individual burners. After the burners discharge the cinder through a bottom hopper into one of the monorail dump buckets, it is lifted by the monorail crane and moved to the cinder storage to cool. From here to the barges the trip is usually made in dump cars filled from the bottom of the storage bins. The monorail system leaves a most favorable impression on the casual visitor, for it looks as though it were easy to operate and in a compact plant the elimination of surface traffic is much to be desired.

The Production of Sulphur Dioxide

There are three burner systems at the Davison plant. The first consists of twelve Wedge burners (Fig. 2). This is the oldest installation and the burners are operated in groups of three, each group feeding a system of lead chambers. A more recent installation consists of six Herreshof burners and finally a war-time installation of Glen Falls rotary sulphur burners which operate on a separate chamber system. The location of these units is indicated on the accompanying plan (Fig. 3).

Ore burners are a fairly familiar installation, but a few words of explanation may not be out of order for those who have never seen them. Large cylindrical shells about 20 ft. in diameter and 20 ft. high, inside of which are five to seven shelves or hearths each filling up most of the horizontal cross-section and discharging alternately at the center and at circumference so that the ore is moved first out to the edge of a shelf, is dropped to the next and then is moved into the center. Small plows attached to large cast-iron arms move the ore and keep it turning over so that the burning will be even and complete. The top of the furnace is also fitted with these small plows or rakes which gradually work the ore into the center of the burner, where it is fed through the sand lute onto the first hearth.

The Wedge burners differ from other burners in that the arms are individually water-cooled. This has been a much-heralded feature and yet it is apparently not without its disadvantages. The Herreshof burners are not very different except that the arms are air-cooled. Within the last year or two comparative repair costs on the two systems have revealed a striking difference. The ratio of the number of arms repaired on the Wedge burners is 13 to 1 on the Herreshof burners. This difference is so great as to warrant considering the installation of Herreshof burners in place of the Wedge type. This situation has instigated two investigations at the Davison Chemical Co. In one they have

FIG. 4—CINDER STORAGE

FIG. 5—METHOD OF LOADING BURNER FEED HOPPERS THE "SECOND STORY" OF THE MONORAIL

changed a water-cooled burner into an air-cooled burner and are operating it with this change to ascertain whether the water-cooling of the arms is the trouble or whether it is a fault of design or material. The other investigation has as its objective the suitability of other metals, particularly the new thermal alloys as material for burner arms.

The maximum capacity of these burners is 23 tons per day for the Herreshof and 20 tons for the Wedge type and both require about 3 hp. each for their operation.

An interesting operating angle on these ore burners is the prejudice of the workmen, who by a large majority favor the Herreshof type. Perhaps it is the more frequent repairs on the Wedge burners that has created the prejudice, but apparently the Herreshofs "give better gas"—"they burn better, too." Such a prejudice must not be lightly dismissed nor yet taken at face value. There seems to be some basis further than the repairs, however, for it is reported that a more even, more complete combustion is obtained in the Herreshof type. Whether it be due to a supercooling by the water-cooled arms or not is a matter of conjecture.

It will be observed from the accompanying diagram (Fig. 3) that the chamber plants are built out from either side of a central line on which is constructed the ore and cinder storage—systems *ABCD* fed by the Wedge burners lie to the south of the lines and systems *E* and *F*, fed by the Herreshof burners and the Glens Falls sulphur burners, lie to the north. In case of expansion the additional units of ore and cinder storage, burners and chambers would be built out east of the present installations, continuing the same general scheme of construction. It is another manifestation of the well-worked-out fundamental plan.

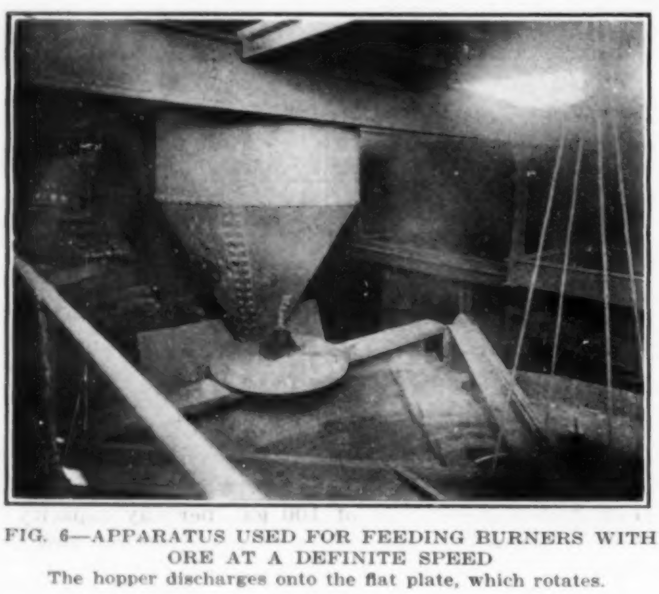


FIG. 6—APPARATUS USED FOR FEEDING BURNERS WITH ORE AT A DEFINITE SPEED
The hopper discharges onto the flat plate, which rotates.

It is, of course, hopeless to do more than mention a few outstanding features of the chamber plants themselves. To anyone who has operated a chamber plant and got on to its temperament the impossibility of describing the operation of any chamber system in even a long article is obvious. Therefore if we seem incomplete perhaps we may be forgiven.

The general system of operation at the Davison Chemical Co., as originally designed, consisted in combining the gases from two sets of hot chambers into a single set of cold chambers. In other words, burner gases enter the hot towers (Glover towers) and then pass through two rows of lead chambers in parallel. At this point the gases from the two rows are united and pass through a single return row. This system has not been rigidly adhered to and some of the systems have been changed to a conventional eight-chamber set.

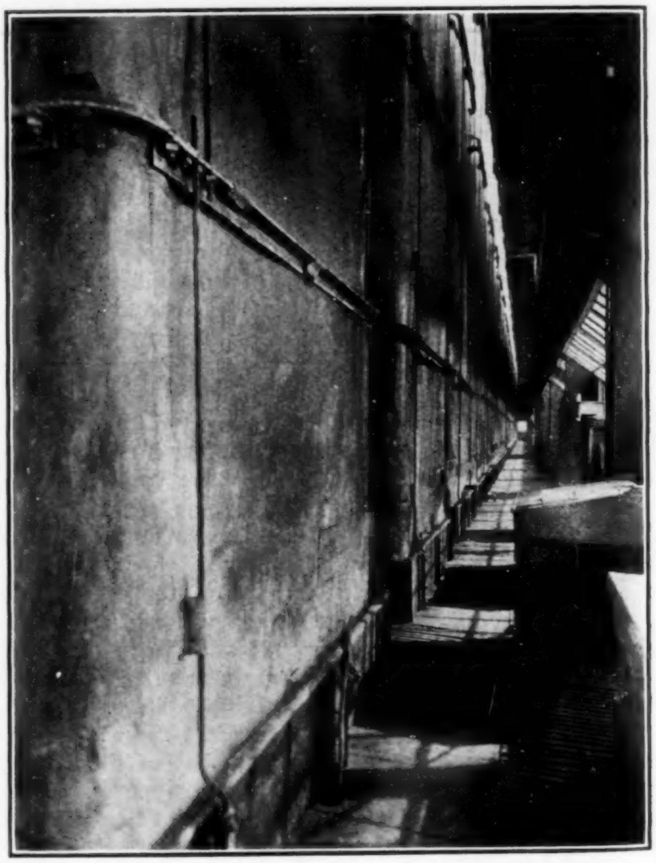


FIG. 7—LOOKING ALONG A BATTERY OF LEAD CHAMBERS

A Unique Hot Tower

One of the most striking units in the chamber plant is a gigantic hot tower. It is 30 ft. in diameter and when the plant is operating to capacity it keeps two cold towers (Gay-Lussac towers) busy absorbing niter gases. It has a daily capacity of 400 tons and has

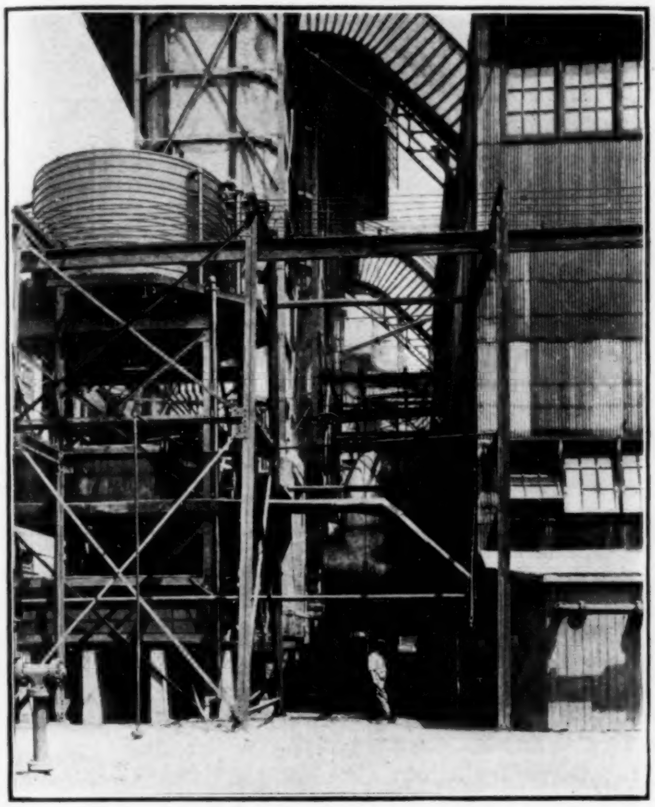


FIG. 8—HOT AND COLD TOWERS
Showing also rectangular lead ducts from hot tower to first chamber. Also note steel type of construction.

worked satisfactorily ever since its installation. It is oversize, of course, for the rest of the unit, but a chamber plant is just about the last place where an oversize unit is undesirable or wasted.

Introducing Niter

The introduction of niter gases into the system has generally been accomplished throughout the industry by the execrable method of "potting." This system consists in adding increments of sulphuric acid to nitrate of soda which is contained in a heated cast-iron pot. The evolved gases are introduced into the system and the resulting niter cake (sodium acid sulphate) is discarded. The size of the potting charge varies widely and in general a large potting charge gives more even results. This system is a hoary survival, and although in almost universal use has little to recommend it. The evolution of gas is irregular, and this has a bad influence on the operation of the system. In some of the units at the Davison plant another system is used that in its present state could only be used on acid for fertilizer or similar uses where purity was not vital. It consists of dissolving the niter and introducing it into a front chamber by means of specially designed atomizers. This produces an even, controllable flow of niter gases and makes the red plume (nitrogen peroxide in the cold tower effluent) much less pronounced. Of course this system produces acid in the front chamber which contains a small amount of sodium acid sulphate. Another method which is employed at some plants consists of introducing weak nitric acid into the hot tower where a supply of this is available.

Still another point is of considerable interest. It is the different methods of boosting the gases through the system. On one system there is a hot fan which takes the gases from the burners and boosts them into the hot tower. This fan has an impeller of cast iron. It is possible to sense a predilection for this method among the operating men. Possibly it is the heroic appeal which the old fan makes churning along month after month with not a shut-down. Its repair card is a model which the rest of the equipment would do well to emulate. On another system is a fan between the hot tower and the first chamber. This is naturally made of lead with a cast-lead impeller, as the gases are wet and cast iron would be quickly corroded. The older systems are operated with cold fans.

Then there are the acid distributors on the towers, which have been perfected to such an extent that acid is distributed over the whole top layer of packing. This is a point often neglected in chamber plants and consequently the tower efficiency is diminished. Mechanical details of this equipment will be described in the "Plant Notebook" within a few weeks. Acid is transported and elevated throughout the plant by means of blow cases entirely.

These random comments will, we believe, give a better idea of the operating methods than more detailed data. The acid phosphate plant will be described in a subsequent issue of *Chem. & Met.*

Sweet-Potato Sirup—A Byproduct Industry

A method for the commercial manufacture of sweet-potato sirup, based on laboratory and plant experimental work, has been developed by the Bureau of Chemistry of the U. S. Department of Agriculture. The following important points were brought out in the course of work described in Dept. Bull. 1158.

Conversion of starch is accomplished satisfactorily by using malt equivalent to one-fifth of 1 per cent of the weight of the potatoes, by maintaining a temperature of 140 deg. F., and by allowing the sirup to stand for 45 minutes after the addition of the malt.

The use of the atmospheric or open-kettle evaporator was practicable in concentrating the crude and filtered sirups.

To produce a permanently clear sirup it was practicable to let the crude sirup cool and stand for 40 hours and then filter it, in order to remove certain salts which caused turbidity.

Satisfactory results were obtained in the filtration of the sirup by using ignited kieselguhr as a filtering aid, 2 per cent of the weight of the potatoes being employed, and filtering cold at 45 deg. Brix.

The yield obtained varied. During the spring of 1921 it was 1.55 gal. of sirup to a 50-lb. bushel of potatoes. An average yield of 1.37 gal. of sirup to a 50-lb. bushel of potatoes was obtained during the spring of 1922.

Adding 10 per cent of other sirups with a sucrose or invert sugar content increased the sweetness of the experimental sirup.

From the standpoint of quality the sweet-potato sirup has possibilities for use as a table sirup, for cooking purposes, and in the manufacture of colored and short-grain candies, such as taffy, kisses and caramels. For baking purposes it might find use in dark products, such as gingersnaps. It also has properties suitable for use in blending with other sirups to prevent crystallization.

For the proposed plant of 100 gal. per day capacity the cost of manufacture of plain sweet-potato sirup, exclusive of containers, is estimated to be 64.3 cents per gallon.

The Great Industrial Promise of

Rubber Latex

Gives to This Report on the Fundamental Properties and Behavior of This Material an Unusual Interest—The Handling, Concentrating and Coagulating Problems of Latex Studied in This Article Are the Key to Its Industrial Success

By C. C. Loomis and H. E. Stump
Consulting Chemists
Released by courtesy of F. R. Henderson & Co.

IN VIEW of the widespread interest in the use of latex inspired by the patents and articles of Mr. Hopkinson of the U. S. Rubber Co. and the patent of Mr. Kaye on the use of latex in the paper industry, and in view of the lack of definite information regarding the characteristics and peculiarities of the material, it would appear to be a fertile field for research.

The present work was undertaken with the idea of getting as broad a viewpoint as possible on the physical and chemical properties of latex and as to how these could be utilized in various industries. Much of both scientific and technical interest has been found out, and a number of patents both domestic and foreign have been applied for.

The rubber world is greatly excited by the fact that latex, the sap of the rubber tree containing crude rubber in colloidal solution, can be shipped without danger of coagulation. The significance of this fact may amount to an industrial revolution. Instead of being coagulated and thus shipped in solid rolls that are difficult to handle, the sap can be concentrated on the plantation and shipped as a liquid. Many other properties of this remarkable liquid increase the desirability of its importation in place of plantation rubber. This article is one of a series studying these properties and other phases of the situation.

In going over the work we shall first give a brief description of latex and its properties, and then take up the various methods by which its physical and chemical properties may be altered and various rubber mixtures that can be obtained through its use. Finally, we shall take up various industrial applications of latex that appear promising.

All of our work has been done on the latex of *Hevea brasiliensis* from the Malay Peninsula, which was shipped into this country preserved with about 0.5 per cent of NH_3. Part of this NH_3 is free and part appears to be combined as an ammonium proteinate or ammonium salt of some resinous fatty acid. It serves two purposes: First, to prevent the action of bacteria, and second, to keep the latex faintly alkaline, which adds to its stability. Latex consists of a colloidal solution of rubber in water varying in rubber content from 20 per cent in young trees to 40 per cent as a maximum. All the samples received have run from 30 to 38 per cent of rubber. It also contains about 2 per cent of protein, 2 per cent resin and some sugars. Considerable discussion has been aroused over the question of what acts as the protective colloid, the protein or the resin, and it is quite possible that they both function in this respect. It has also been stated that the non-caoutchouc materials are valuable components of crude rubber and add to the quality of the finished product. Mr. Hopkinson's patent on spray drying of latex has this feature in mind. The protein with its amino grouping does exert a catalytic or accelerating effect upon vulcanization, but the effect of uncertain quantities of unknown resins and protein material upon rubber mixes is something that will require considerable further study.

It has been pointed out by Henri that latex particles average about 2 microns in diameter, and five different types of particles have been classified by him. The accompanying microphotographs clearly show the difference in size. The peculiar pear shape of the larger particles and the tail at the small end, clearly seen in Fig. 1, are most interesting, and as far as the authors know, without parallel in the field of colloids. Particles of this size are just on the border line of Brownian movement, and aside from this, and end for end revolution, the pear-shaped particles seemed to have a very marked longitudinal vibration, rather vigorous in the small end. The effect of this was to give the field an extraordinary resemblance to a swarm of tadpoles. The nature and function of these tails have never been determined. It is possible that they are small particles attached by an opposite electrical charge to a larger one, but their appearance is that of a fine straight line rather than a particle.

The particles seem to be elastic, as they distort when two particles approach in the first stages of coagulation. It has been noted that the latex particles carry a negative charge and will travel to the positive electrode. This has been proposed as a method of treating fabrics and has been tried as a method of coagulation. In general all except the very weakest of acids will coagulate latex. Metallic salts other than the alkalis also act as coagulants, but these act in a slightly different manner. Mechanical action such as rubbing will bring the particles together and users of latex in mechanical processes should bear this fact in mind. Pumping is fraught with the greatest difficulty, as many types of pumps are almost instantly stopped. We have also noted a decided tendency toward local coagulation when higher percentages of latex are added to paper pulp in a beater, as the beater action seems to bring the particles together. If it is necessary to re-

sort to pumping, a Monteju is probably the safest type to use, although we believe that some success has been obtained with a centrifugal pump.

The addition of dry adsorptive pigments will usually coagulate the latex, as will the addition of most organic liquids such as alcohol or benzol. The type of coagulation with water-miscible liquids seems to be different from that obtained with the immiscible type, but the effect is the same.

At present the latex shipped into the United States available for experimentation and general use has been packed in 5-gal. kerosene tins, two tins to a case. This type of container has much to recommend it, as it is air tight and readily handled. It is expensive and adds to the cost of latex when figured on a rubber basis, but should sufficient demand arise, there is no question that latex could be shipped in bulk in tank steamers, as the United States Rubber Co. is now importing large quantities in this manner. In such a case the price should be very close to that of an equivalent amount of crude rubber.

Since it is difficult to obtain large and steady supplies of latex containing much more than 30 per cent rubber and most of it from young trees on new plantations is much lower even than this, the problem of concentrating the material to decrease the transportation charges is quite a vital one. The material can be concentrated without coagulation by direct evaporation, preferably

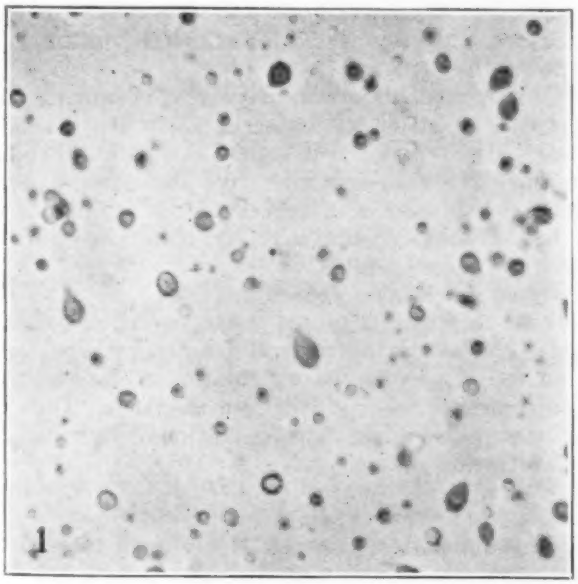


FIG. 1—RUBBER PARTICLES IN CENTRIFUGED LATEX, CONCENTRATED FRACTION

in a vacuum. It is best to add a trace of sodium carbonate or caustic soda to maintain a satisfactory alkalinity during evaporation. However, from small-scale tests, this method appears to have grave operating difficulties. In the first place, there is a tendency to form a skin of rubber over the heating surfaces and surface of the liquid. There is also a great tendency to foam. It might be possible to subject the material to an incomplete spray-drying treatment, such as the U. S. Rubber Co. uses. If so, that company has undoubtedly developed it, but nothing has been disclosed along this line.

Centrifugal action suggested itself as a possible angle of attack, and several attempts were made to centrifuge the material. Ordinary methods being quite useless, through the courtesy of the Sharples Specialty Co., we made several runs in that company's centrifugal machine. Tests in a laboratory type machine turning at 30,000 r.p.m. quickly plugged the machine with a core of pasty material, uncoagulated, which would return to a latex upon the addition of water and which showed a rubber content of 76 per cent dry rubber. The material was of the consistency of cream cheese and would coagulate upon the slightest pressure or rough handling.

From this, we proceeded to a full-sized machine, turning at 16,000 r.p.m. and passed a large quantity of material through it at various rates of flow. Using latex with an initial concentration of 36 per cent coagulable material, the best results we secured was a

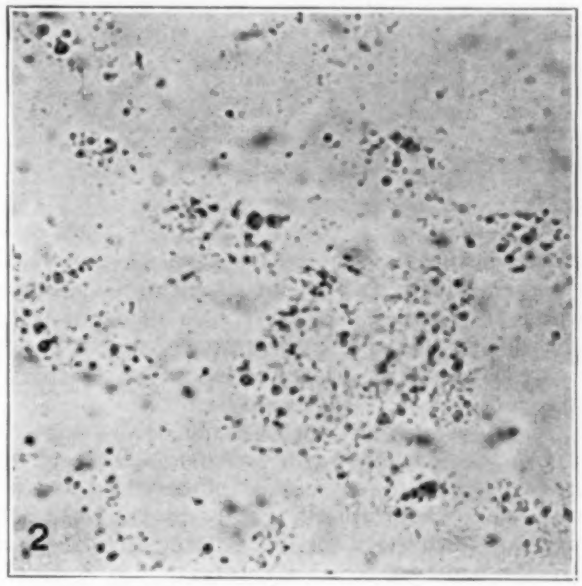


FIG. 2—RUBBER PARTICLES IN CENTRIFUGED LATEX, DILUTED FRACTION

fraction containing 43.8 per cent coagulable material with 31.9 per cent in the other fraction. Of the total amount of coagulable material present in the original latex, 24 per cent went into the concentrate or low specific gravity fraction, and 76 per cent into the dilute, or high specific gravity fraction. Such a separation could hardly be called commercial and we next endeavored to simulate a weaker latex by diluting the original 36 per cent latex with equal parts of water. By passing this material through the machine we secured a fraction containing 44.3 per cent coagulable material with a concentration of 8.1 per cent coagulate material in the other fraction. Of the total coagulable material present in the uncentrifuged material, 55 per cent went into the concentrate and 45 per cent into the dilute fraction.

The nature of the rubber from these two fractions was quite different, the high percentage material giving a very tough, strong material, while the weaker latex gave a low-grade rubber of little strength. We assumed that this was due to the concentration of the rubber in the light or high rubber fraction, resins, sugars and other water-soluble material into the heavy or low rubber fraction. A microscopic examination of the fractions, as shown in Figs. 1 and 2, shows that we had accomplished a rather complete separation of the particles, throwing the large particles into the con-

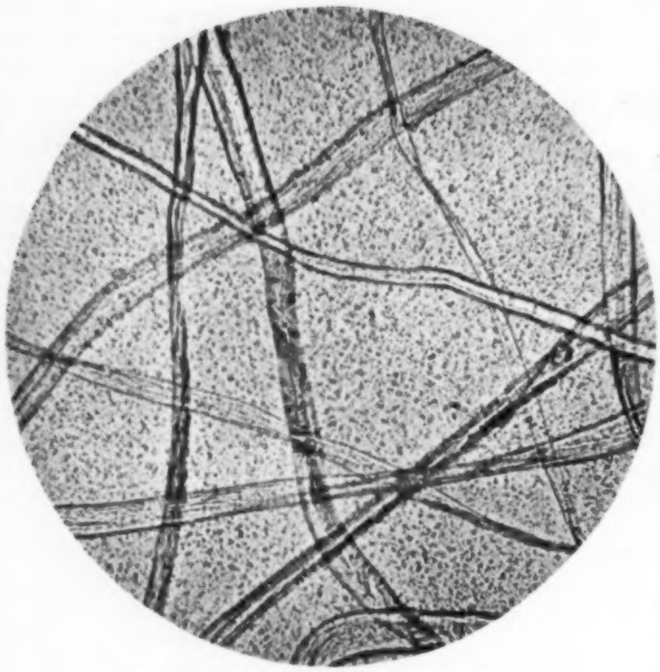


FIG. 3—COTTON FIBERS IN LATEX

centrate, and leaving behind the small particles. While the higher protein and resin content of the heavy thin fraction may explain the difference in characteristics of the rubber, we believe that the difference in size of the particles also has a large influence on the character of the rubber.

The results of these experiments, while unsatisfactory from the standpoint of commercial concentration, seem to indicate a new method of handling and using latex. Such a separation might be useful when a fine-particled material was desired, notably in impregnation where the greatest possible penetration is desired. It would therefore appear that the real field for the centrifugal treatment of latex is not in concentration but rather in the separation of latex into two fractions of distinctly different properties. Still more important is the apparent possibility of obtaining by this means a good grade of rubber from low-quality latices from a variety of sources which will not yield good rubber by mere coagulation. As soon as material is available we expect to conduct some experiments with the latex of ordinary milkweed, to see if a good quality rubber can be obtained from it by this process. In other words, centrifugal force is a possible method both for separating the rubber particles from protein, resins and water-soluble impurities of different dispersion from the rubber and also for classifying the rubber itself according to particle size.

It was at first thought that the method of partial coagulation which is described in detail later offered a possible method of concentrating latex. However, the increase of viscosity of the material on partial coagulation is against its use for concentration. A highly diluted latex can be readily concentrated by partial coagulation within the limit of its reversibility and filtration, but the resulting cheese-like semi-solid product will still contain about 70 per cent of water. If much more water be removed by application of pressure the mass coagulates to crude rubber. Partial coagulation therefore appears to hold out little hope as a method of concentration.

Another possible method of concentration is by electrolysis. As previously stated, the rubber particles travel with an electric current to the positive electrode. If this be covered with a semi-permeable membrane such as parchment paper or collodion, coagulation is prevented, and a thick paste of highly concentrated latex is deposited on the membrane. With suitable cell designs, this method of concentration might be commercially feasible.

However, we have developed another method of concentration which requires but little apparatus and is simple and certain in operation. Unfortunately, this cannot be disclosed until later, when the foreign patent situation has been straightened out.

Some Fundamentals of Coagulation

The work of Victor Henri on latex as given before the rubber convention of 1908 is classic in the study of this material. Working with dialyzed latex, he tried numerous coagulations and various strengths of acids and other mineral salts, and distinguished between true coagulation with acids and a gel-like formation with metallic salts other than the alkali group. In his work he failed to disclose any measurements of the hydrogen-ion concentration, or p_H, or the difference in behavior between a preserved undialyzed latex and a dialyzed material. With a view toward commercial control and utilization we have worked with undialyzed latex, containing the ammonia used for preservation, and have studied the behavior of various coagulants at varying hydrogen-ion concentrations. In this work we have used Clark and Lubs' set of colorimetric indicators, to determine the p_H.

We have noted first that with acid coagulation this takes place at about p_H 5.5 or at about the middle of the methyl-red scale. All samples of latex submitted to us have this characteristic. We also noted a sample of latex which had been preserved with formaldehyde and had a broken gelatinous structure, and this too showed the same p_H value.

Dialyzed latex also shows this same p_H value. It would be interesting to see what variation exists in actual p_H value in the natural freshly gathered latex, and to follow commercial coagulation with such a set of indicators, or with a hydrogen electrode. It is possible that this might shed additional light on the standardization of output.

The Action of Metallic Salts

The gel formation noted by Henri upon the addition of metallic salts other than the alkali salts has been carefully studied. The phenomenon is probably the formation of the metallic soap of heveaic acid together with the precipitated metallic proteinate. By the addition of such strongly acid materials as sulphate of alumina, partial coagulation is gradually brought about with a continued change in the p_H value, the value decreasing gradually through the coagulating point (p_H 5.5), where a very stiff cheese-like material is obtained. Beyond this point reticulated lumps appear and the true rubbery coagulum is noted. On the other hand, if a truly neutral salt, such as zinc acetate, is used, the cheese-like structure appears almost instantly and the entire mass remains decidedly alkaline in its reaction. It has also been pointed out that such a gel-like material can be stirred until the gel is entirely broken up and no longer resembles the original material from a physical standpoint. However, if such a violently agitated mass be allowed to stand, it will reset to its

original structure. Under a microscope the particles of a gel broken by stirring show that they are still agglomerated, as they maintain the group structure, and its action is still similar to the cheese-like material and not like untreated latex.

Temperature is an important item in the formation of this cheese-like material. The latex must be kept cold, as 30 deg. C. is sufficient to start incipient coagulation. Heating the material only slightly after the paste has been formed will also start a thickening action culminating in a complete coagulation. The strength of reagent used for the purpose is also important. In too great concentration spots of true coagulum are likely to form where the drops of reagent strike the latex.

The action of such a cheese-like material toward cellulose is instructive. If we immerse cellulosic fabric in latex, remove it and then subject it to pressure, the latex and rubber particles are squeezed out, leaving the fabric almost free of rubber. However, if we first add some semi-coagulating material to the latex and subject the fabric to the same treatment, we find that there is a decided adherence of rubber to the fabric. In fact, under normal conditions latex is incapable of being spread on cloth, as its watery nature causes it to run freely away. We have found that this phenomenon of adherence to fabrics persists even in material that has been partly coagulated and violently stirred to break the gel structure. In fact, it will occur when minimum quantities of the semi-coagulant are used and before the latex has assumed its gel-like form. The nature of this adherence is still open to question. Fig. 3 is a micrograph of latex together with some fibers of cotton. It will be seen from this that there is no real adherence to the fabric and apparently the latex and the cellulose carry the same electrical charge. Fig. 4 shows the same fiber, together with latex which has been treated with a partial coagulating reagent. The groups of particles are clearly visible, but the way in which they seem to attach themselves to the fiber is very remarkable.

Possible Industrial Importance of Cheese-Like Coagulum

The importance of this type of coagulation in the industries seems to have been rather overlooked. While possible a weaker structure is brought about by the use of such metallic salts, as was shown by Henri in his microscopic study of coagulating agents, the affinity for cellulose should more than overbalance any such defect. The ease with which such a material can be handled, spread or coated should make it ideal in the manufacture of sheeting or in such processes where a benzol solution is laid on with a spreading knife. We have also noted a different type of semi-coagulation which is brought about by the usual protein coagulants such as formaldehyde and tannic acid.

It occurred to us that the pear-shaped form of the particles of rubber in latex and the tail which they have might give us the key to the phenomena of coagulation. With this in view, we have made a microscopic study of the behavior of latex on coagulation. So far we have been unable to prove any definite connection between coagulation and the tail on the rubber particles, although we still suspect the existence of such a connection and hope that it can in some way be demonstrated under the microscope.

However, we have obtained a very clear view of the

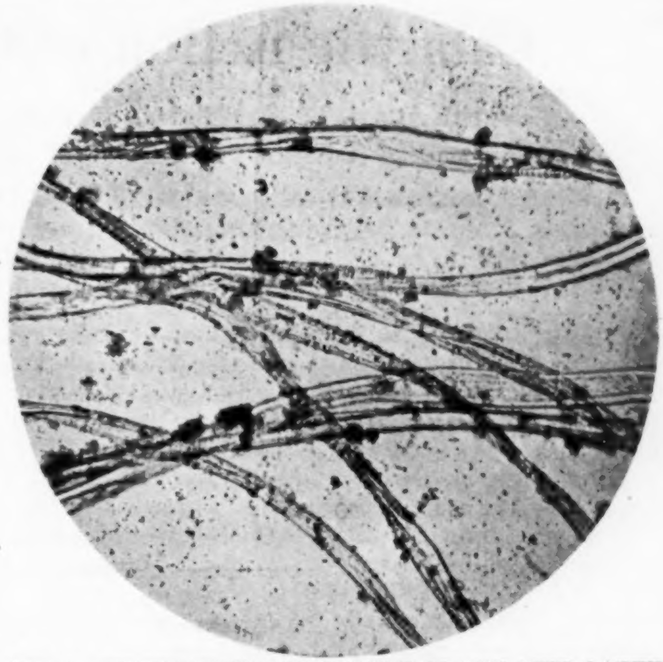


FIG. 4—COTTON FIBERS IN PARTLY COAGULATED LATEX

actual mechanism of coagulation, by taking a sample of latex and adding small increments of a dilute solution of aluminum sulphate. After each addition a small portion was removed, suitably diluted, and observed under the microscope. It was found that there is a progressive tendency for the particles to form small groups. At the start these groups consist mostly of from two to ten particles with considerable distance between the individual particles. However, the movements of the particles in a group with regard to one another is considerably restricted, consisting largely of the longitudinal vibration. No definite orientation of the particles could be discovered, although a grouping of two particles lengthwise to each other, one curved convex and the other concave, is very common.

There are also frequent couplets where a smaller particle appears to have actually stuck by its pointed end to the side of a larger particle. However, we were unable to find any universal type of orientation. As more and more coagulant is added, the particles gather into ever larger groups and at the same time draw closer and closer together. As they draw together, the individual particles become considerably distorted, but still clearly maintain their identity. Finally the point of true coagulation is reached, and the appearance here is that the particles actually burst and flux together. This phenomenon takes place with such rapidity that we have been unable to actually observe the bursting of a particle, but after true coagulation has taken place, it is impossible to find any individual particles.

Where the groups just described were, there will be found a homogeneous blot of rubber from which the characteristic particles have entirely disappeared. As further evidence, a slide was mounted with extremely dilute latex and allowed to dry. In this way, a number of the particles were kept entirely separate from other particles, and their behavior on drying noted. It was found that, on drying, these particles gave every evidence of bursting. They become shapeless patches of rubber. It is possible that the coagulation of latex by grinding it in a thin film, as is done in many types of pumps, is brought about by a mechanical rupturing of the rubber particles.

Catalytic Action of Colloids in Corrosion

Friend's Colloidal Theory of Corrosion Deserves Careful Consideration Because It Seems to Account for the Accelerating Action and to Clear Up Various Anomalies Which All Other Theories Have Failed to Do Satisfactorily

By JOSEPH KAYE WOOD
Engineer, Western Electric Co., Inc., and A. T. & T. Co.

THE CORROSION PROBLEM, first recognized in the early use of iron, has so far defied solution, despite the fact that it has been studied exhaustively in connection with various chemical and physical phenomena which gave rise to several theories. These theories, such as the acid, alkali carbonate and the electrolytic, although contributing somewhat toward the actual solution of the problem, have not agreed satisfactorily with the observed facts. Consequently new fields of research have been entered, notably that of colloidal phenomena, in order to find an explanation of these anomalies. Thus J. Newton Friend of the Municipal Technical School, Birmingham, England, presented his new theory of the corrosion of iron, based on the formation of colloidal ferrous hydroxide, to the American Electrochemical Society in September, 1921. Somewhat later Wilder D. Bancroft gave support to this theory by the statement in his paper "Colloid Chemistry and Metallurgy"[1] that "the corrosion problem is essentially colloid chemistry." My purpose, therefore, in writing this article is to promote a lively interest in this phase of the corrosion problem among those concerned with the problem in general. The substance of the article will be chiefly on Dr. Friend's paper, but for the benefit of those not prepared to think of corrosion in this new way, the subject of colloids will first be reviewed briefly.

Corrosion of iron being one of the most serious problems of the age, the whole question should be attacked nationally or, better still, internationally. Wars are fought at great expense to cure certain evils with the most remote chance of ever obtaining full reparation. Why not then spend a few million dollars wisely toward obtaining a solution of the corrosion problem with the possibility of saving millions of dollars and effecting economy in the utilization of our total iron supply?

What Constitutes the Colloidal State?

According to Alexander any substance is in the colloidal state when the constituent particles consist of molecular or atomic groups whose size varies approximately from about $100\mu\mu$ down to about $5\mu\mu$ ($\mu\mu = 4 \times 10^{-8}$ inches). The molecules or atoms may be arranged in an orderly manner, forming ultramicroscopic crystals, or may be haphazardly arranged, giving the amorphous state. When the groups or colloids are dispersed in a liquid medium, which may or may not be chemically identical, the resulting solution is called a "sol." With substances of large molecular dimensions (about $5\mu\mu$) such as albumin, soluble starches, etc., the particles may consist of a single molecule, so that true solutions of these inherently colloidal substances may be also classed as colloidal solutions. On the other hand, the colloids of such substances as gold, silver and platinum produced artificially by electrical pulverizing under a liquid suitable as a dispersing medium are found to have molecular dimensions smaller than the minimum dimension in the colloidal range. However, according to Bullowa[2], R. Zsigmondy has prepared gold solutions so finely divided that the particles approached rather closely to the molecular dimension.

The colloidal state is determined by various means, one being ultrafiltration in which animal membranes or jellies are used to filter out the colloids which are relatively large when compared with the particles of most true solutions. The separation may also be accomplished by centrifugation at 6,000 or more revolutions per minute.

Colloidal solutions are turbid or colored because the size of the particles are such as to intercept or reflect all or some of the color waves of the solar spectrum. Thus some idea of the size of colloids which are below the limit of microscopic visibility can be obtained by means of the ultramicroscope, the principle of which is based upon this property of light reflection.

Sols of such materials as albumin, soluble starches, etc., are rather insensitive to precipitating influences. However, large quantities of a neutral salt, as for example ammonium sulphate (Bullowa) will cause these sols to separate out of solution. The resulting solid, which is apparently an amorphous mass containing considerable absorbed water, is called a "gel." When the dispersing medium is water, these gels are called hydrogels and the corresponding sols before solidification are called hydrosols. In the above case the hydrogels will redissolve if sufficient water is added, and hence the colloids are said to be reversible. Separation by boiling, however, is an irreversible process.

On the other hand, the inorganic sols, as for example ferric hydroxide hydrosols $[Fe(OH)_3]_n$, are more or less sensitive to precipitation influences. The precipitation in this case is localized—that is, the colloids "floc" together in groups, thus forming a broken up gel mass suspended in the dispersing liquid. This process of flocculation, which can be brought about by electrolytes, colloids of opposite electric charge, dehydration and radium emanations, is irreversible. The colloidal particles act somewhat like ions, positive colloids being attracted to a cathode and negative colloids to an anode provided no electrolyte is present. When an electrolyte is present in a colloidal solution and the

[1]Lecture delivered to the American Institute of Mining and Metallurgical Engineers at the New York meeting, February, 1922.

[2]Prof. H. Beckhold's translated copy of Bullowa's book, "Colloids in Biology and Mecidine."

electrodes are omitted from consideration, the electric charge at the interface between the dispersed particle and the dispersion medium is neutralized by the opposite electric charge of the ion (electrolyte). The greater the valency of the ion present the greater will be this neutralizing action. Thus when the attractive forces which maintain the dispersion of the colloids throughout the dispersing medium are destroyed, the colloids floc together under their own cohesive forces. For example, colloidal ferric hydroxide which is positively charged in water may be precipitated by the anions of the following inorganic salts, dissociated in water (electrolyte):

Salt	Relative Order
Chlorides and nitrates	Lowest valency, least precipitation
Sulphates	Medium valency, medium precipitation
Chromates	Highest valency, greatest precipitation

Colloids may also be precipitated from solution by dehydration of the sol in which the absorbed water is driven out. Thus ferric hydroxide hydrosol may be precipitated by alcohol (not an electrolyte) due to dehydration.

As pointed out previously, inorganic sols are in an unstable condition and hence have great catalytic activity, while the sols of such materials as albumin, soluble starches, sucrose, gum acacia, dextrine, gelatine and agar are rather stable. When any of the latter sols are present in about a 0.2 per cent neutral solution they reduce the catalytic activity of the inorganic sols and also tend to prevent their precipitation. Thus these colloids are called protective colloids, because they protect the inorganic sols from precipitation and tend to stabilize them. Small amounts of protective colloids confer their own properties on other colloids due as is generally believed to the forming of a protective layer around the inorganic sol.

Corrosion in General

Metals probably do not corrode when alone in any one of the following mediums at room temperature: (1) Pure water. (2) Dry air (or oxygen). (3) Presence of electrolyte. Some say all three mediums are required simultaneously in order to have corrosion. Others contend that corrosion is possible when only the first two exist together, because of the dissociation of H_2O into H^+ and OH^- ions, although additional electrolytes greatly accelerate the corrosion. Corrosion of metals then in the atmosphere is somewhat different from corrosion under water. In the former case oxygen is greatly in excess of the water (humidity or rain), while in the latter case water is in excess of oxygen (dissolved).

The amount of corrosion under water, therefore, must be influenced greatly by the amount of dissolved oxygen present. Thus the fact that carbonic acid increases the amount of oxygen which water will dissolve gave rise to the carbonic acid theory of corrosion. In practice water is made non-corrosive by extracting the dissolved oxygen by preliminary corrosion.

Most all metals corrode in water and oxygen, although there probably are three general ways in which this is manifested. These are as follows: (1) Invisible quick-forming surface film giving passive state: chromium and ferrochrome. (2) Visible and non-accelerating surface film: aluminum, nickel and copper. (3) Visible and accelerating surface film: iron and steel.

In the third case the film usually does not tend to spread uniformly, due, as is generally believed by proponents of the electrolytic theory, to the impurity or stressed condition of the iron which gives rise to points of relatively high potential. The "sol" tension, which is the tendency an atom of a metal has to go into solution, is greater at these points. Corrosion takes place here, while the H^+ ions are attracted to the less positive parts, where it forms a protective film of hydrogen. Thus according to this theory absolutely pure and unstressed iron should not corrode. But where, outside of the chemically prepared product or the wrought-iron column in India, do we have such iron? Furthermore, the corrosion is accelerated, because the product of this corrosion is electronegative to the metallic iron. Although this theory has met with more favor than any other in the past, it has failed to agree with corrosion tests in cases where certain physical and chemical phenomena were introduced.

Inasmuch as iron and steel have not the property of naturally forming a self-protecting film, either visible or invisible, considerable study has been made toward providing artificial films. None of the visible type with the possible exception of Parkerizing, bower-barffing and hot-dip galvanizing, which are limited to certain kinds of apparatus, have been a complete practical success. Metallurgists, on the other hand, have been successful in developing passive steels (invisible type of film), such as the various stainless steels, but as most of these are rich in nickel or chromium or both they are very expensive.

Importance of the Problem

Therefore the solution of the problem of the corrosion of iron and steel is of extreme importance because of the following reasons:

1. Most useful and abundant of all metals.
2. Most easily corroded of all metals.
3. Product of corrosion, a hydrated form of iron oxide, $Fe(OH)_3$, commonly called rust, is a great accelerator of further corrosion.
4. Rust, which is very crumbly and weak, is a mighty poor substitute for our most useful and strongest metal.
5. Considered from a general economical standpoint, it is important because our supply of iron is rapidly being converted into rust from which it cannot be reclaimed. Recently Sir Robert Hadfield has estimated that 29,000,000 tons of iron is dissipated in the form of rust every year, which is a stupendous loss considering that it represents one-quarter of the world's normal output of iron per year.
6. Considered from a commercial standpoint, it would be the means of saving millions of dollars spent annually in *attempting* to prevent corrosion, replacing iron or steel parts rendered useless by corrosion and using more expensive metals of greater dimensions because they are weaker.

From the above it becomes quite apparent that the corrosion of iron is one of the most serious problems of the age, and any contribution toward its solution is of very great importance. The colloidal theory is therefore of great interest, because it seems to account for the accelerating action and to clear up anomalies which all other theories have failed to do satisfactorily.

The colloidal theory of the corrosion of iron and steel is stated by Dr. Friend as follows:

1. Iron, in coming into contact with liquid water in the presence of air or oxygen, slowly oxidizes to ferrous hydroxide. This, however, is produced in the colloidal state, a state in which it is usual for many substances to be particularly reactive chemically.

2. This ferrous hydroxide, while retaining its sol state, is oxidized to ferric hydroxide.

3. This higher hydrosol is now alternately reduced in contact with the iron and oxidized again by atmospheric oxygen, thus catalytically accelerating the oxidation of the metal.

4. When the sol flocculates or precipitates out, it yields rust.

According to this theory, then, rapid corrosion depends upon the catalytic activity of colloidal ferrous hydroxide without the formation of which iron would be relatively "noble" or inert toward aërated waters. Hence anything that removes the colloids or destroys their catalytic properties by chemical (precipitation, dehydration, etc.) or physical means should tend to retard corrosion, and on the other hand, anything that tends toward the maintenance of the colloids in the sol state should enhance corrosion. We shall, therefore, show in what follows how various anomalies in corrosion may be cleared up by this new theory.

A. Dilute solutions of sodium chloride are exceedingly corrosive toward iron, while saturated solutions of the same salt are less corrosive than distilled water. This was attributed by Adie in 1845 to the decreased solubility of oxygen in the solutions. Dr. Friend in his paper states that if this is the only factor to be considered in connection with corrosion in inorganic salt solutions, the corrosive curve for various concentrations should show a general similarity to the oxygen solubility curve after the maximum corrosion has once been attained. His curve,[3] illustrated in Fig. 1, shows that this is probably not the case. The continuous line gives the relative corrosion of pure electrolytic iron foil in various concentrations of potassium sulphate solution at 5 deg. C., while the broken line gives the relative solubilities of oxygen in the solutions. When sodium chloride is used instead of potassium sulphate, these two curves nearly coincide, as may be seen in Fig. 2, which accounts for Adie's conclusions.

Now it was shown previously that the addition of inorganic salts to water will cause the precipitation of the ferric hydroxide hydrosols formed on the surface of the iron. The greater the concentration or the valency of the salt the greater will be this precipitating action, while the amount of corrosion will be smaller, because the rate of corrosion depends upon the maintenance of the catalytic hydrosols. "Since relatively high concentrations of chlorides are required to precipitate ferric hydroxide sols, it will now be evident why, as indicated in Fig. 2, the corrosion and solubility curves for sodium chloride manifest a general similarity, whereas in the case of the sulphates which are more powerful precipitants the fall in the corrosion curve is much greater than the reduced solubility of the oxygen would lead us to expect."

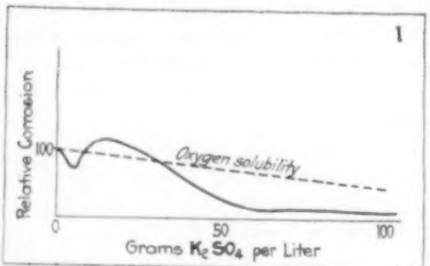
[3]Figures reproduced from J. Newton Friend's paper, *Trans. Amer. Electrochem. Soc.*, vol. 40, 1921, pp. 63-80.

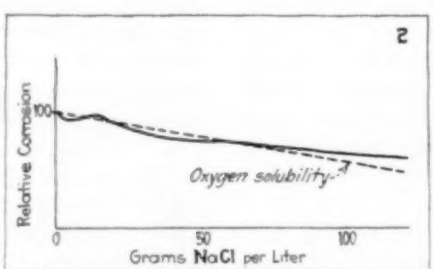
TABLE I—CORROSION IN SALT SOLUTIONS

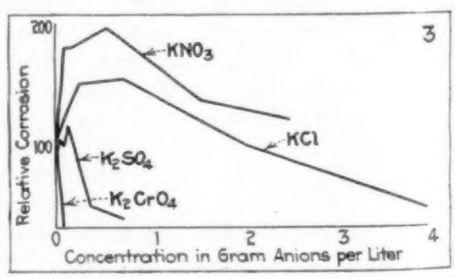
Gram Anions of KNO_3 Per Liter	Relative Corrosion at 13.5 Deg. C.	Gram Anions of KCl Per Liter	Relative Corrosion at 15 Deg. C.	Gram Anions of K_2SO_4 Per Liter	Relative Corrosion at 15 Deg. C.
0	100	0	100	0	100
0.15	183	0.2	149	0.03	70
0.50	210	0.67	155	0.06	115
1.50	133	2.0	88	0.09	120
2.40	114	4.0	16	0.29	23
				0.58	14

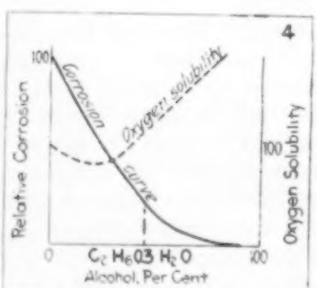
Table I gives the corrosion data shown graphically in Fig. 3, which was obtained with various potassium salts in solution at room temperature. The concentrations of the salts are expressed as abscissas in gram anions per liter, and the corrosive actions are expressed as ordinates, relative to water, which is taken as 100. In general the curves rise abruptly to maximum corrosion due to the solvent properties of the small concentrations on the iron, and as the concentration of the salt increases the corrosion is reduced, not merely by reducing the amount of dissolved oxygen but also by precipitating out the ferric hydroxide sols and thus tending to remove the catalyst as rapidly as it forms. Furthermore, the curve shows, in accordance with the order of precipitation given in the premilinary discussion on colloids, that higher concentrations of the salts having the anion of lowest valency, such as the chlorides, are required than of the salts having the anion of highest valency, such as the chromates. This certainly supports the theory.

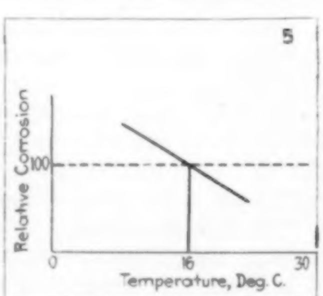
B. Without our knowledge of the colloidal theory of

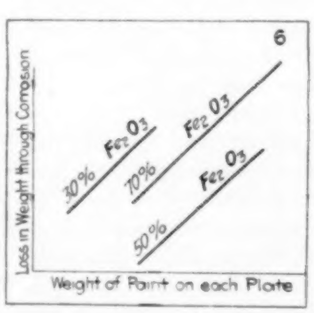


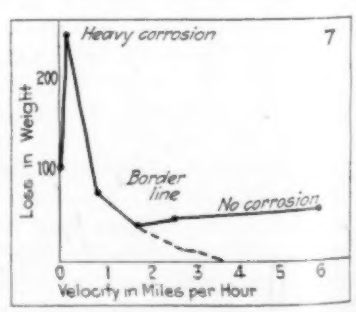












EFFECTS OF CORROSION

Fig. 1—In K_2SO_4 solutions.
Fig. 2—In NaCl solutions.
Fig. 3—In different salt solutions.
Fig. 4—In alcohol solutions.
Fig. 5—In sea water and distilled water at different temperatures.
Fig. 6—Corrosion of painted plates.
Fig. 7—Corrosion of pure electrolytic iron foil in moving water.

corrosion we should not expect the corrosion of a piece of iron, immersed in water, to be influenced in any chemical manner by the addition of alcohol. This opinion would be held because iron will not corrode in pure ethyl alcohol and because alcohol does not ionize in water. But we should expect some physical action such, for example, as variation in the oxygen solubility, and as a consequence we might further expect the rate of corrosion to bear a closer relation to the oxygen solubility curve than in the case of the dissolved salts already considered.

Results of corrosion tests, shown graphically in Fig. 4, in which the alcoholic content was varied, shows that the above conclusion, although logical with what we already know, is by no means the case. There does not appear to be the slightest relation between the rate of corrosion and the solubility variation due to variation in alcoholic content.

On the basis of the colloidal theory, however, the reduction in corrosion shown in Fig. 4 can be explained by the fact that alcohol tends to precipitate ferric hydroxide hydrosols due to dehydration, as explained previously. Dr. Friend states that "it will be observed (Fig. 4) that most of the corrosion has been inhibited when sufficient alcohol has been added to yield the hydrate $C_2H_6O.3H_2O$—which supports the theory."

Curious Effect of Rise in Temperature

C. A very remarkable observation of great importance to marine engineers is the curious effect of the rise of temperature upon the relative corrosivities of distilled water and sea water. Fig. 5 shows, graphically, the results of corrosion tests made at the temperatures shown as abscissas in both distilled and sea water. The observed corrosion in distilled water at each temperature is taken as 100, while the corrosion in sea water is taken relative thereto. This anomaly cannot be explained on the basis of oxygen solubility.

The colloidal theory, however, enables us to give the following explanation: Ferric hydroxide sols are sufficiently stable to withstand precipitation upon boiling of the liquid under favorable conditions. But the addition of small quantities of electrolytes readily causes their precipitation upon rise of temperature. "While the normal tendency of sea water would be to increase corrosion with rise of temperature, this tendency is in part counteracted by the inhibiting action due to the increased precipitation of the catalytic sol. The result is that, relatively to distilled water at similar temperatures, the rate of corrosion falls."

Why Thin Paint Films Are Better Than Thick Ones

D. In 1913 Dr. Friend called attention to the curious fact that iron immersed in water for several months corrodes more seriously if protected with a thick layer of paint than with a thin one. This statement ought to be of great commercial interest, inasmuch as better results are obtained with less cost. Dr. Friend states that full details of his most recent experiments have not as yet received publication, but that the curves in Fig. 6 give a good idea of the general type of result obtained. The various paint mixtures used consisted of pure boiled oil with different amounts of deep Indian Red pigment (essentially Fe_2O_3) ranging from 30 to 80 per cent of pigment.

Here again we may find an explanation from the colloidal standpoint. As pointed out previously, protective colloids such as starch, gelatine, agar, etc., when added in small quantities to liquids containing inorganic sols, tend to prevent precipitation of these sols and also to reduce their catalytic activity. Now paint is essentially colloidal in structure and the linoxyn or oxidized coat of linseed oil functions as protective colloid and thus retards the catalytic activity of the ferric hydroxide sols, reducing the rate of corrosion. But, as it is stated, a very thin film of the oil suffices to do that, and further thicknesses merely increase the quantity of protected colloidal hydrosol and thus by pure mass action increase the rate of corrosion.

Tests made by Dr. Friend in connection with the solution of the above anomaly show that the order of inhibiting power of the various protective colloids in neutral solutions is as follows: sucrose, gum acacia, potato starch, dextrine, gelatine, egg albumin, and agar, the latter being the most powerful inhibitor of corrosion. This brings to the writer's mind a test employed in demonstrating the electrolytic theory of corrosion, particularly when the specimen of iron is unequally stressed. A specimen of iron is placed in a jar of hot liquid agar to which is added a few drops of potassium ferricyanide and phenolphthalein as an indicator for alkalinity. Upon cooling, the agar solidifies, but inasmuch as it is practically all water in the gel form, ionization will take place in it. After a relatively short time the specimen became red with blue spots here and there, but mostly at the stressed part. The red part denoted alkalinity due to KOH and phenolphthalein, and therefore uncorroded iron. The blue spots denoted the presence of $Fe(CN)_6$, which is acidic and which therefore indicated corrosion. The stressed part (colored blue) is more electropositive than the unstressed part (colored red), hence the reason for the corrosion of this part. The particular point which I wish to call attention to is the fact that the protective colloid, agar, the most powerful inhibitor of corrosion, as pointed out above, did not, in this case, retard corrosion. Thus the explanation of this anomaly must be the same as in the case of Dr. Friend's on the behavior of his coats of paints—namely, that the effect of mass action was enough to overcome the effect of the reduction in catalytic activity of the inorganic colloids.

Effect of Velocity

E. In 1910 Heyn and Bauer showed that when iron is immersed in flowing water the rate of corrosion at first rises rapidly with the rise in rate of flow, but upon reaching a certain limit the rate of corrosion diminishes. Dr. Friend made tests of this kind, in which he placed narrow, weighed strips of Kahlbaum's pure electrolytic iron foil in a glass tube, connected with pressure tubing to the main water supply. The rate of flow of the water varied from 0 to nearly 6 miles per hour and the duration of the experiments from 1 to 2 days. The results of these tests are shown graphically in Fig. 7. Dr. Friend states that although it will be observed from a study of this curve that the iron always suffered a slight loss in weight, no visible corrosion occurred with velocities exceeding about 2.5 miles per hour, while the loss in weight was very much less than that in still water. He further states that this result appeared very remarkable, for, according to unpublished results of J. H. Dennett and himself, the rate of solution of iron in acid is almost directly proportional to the rate of movement, even at velocities of from 30 to 40 miles per hour.

This peculiar phenomenon also is explained by the colloid theory, and is a good example of how the catalytic ferric hydroxide sols are prevented from accelerating corrosion by physical means. A gentle flow of water serves to bring up fresh supplies of oxygen and hence to accelerate corrosion. Increased rates of flow, however, cause the catalytic hydrosols to be washed away as rapidly as formed, and are thus unable to act catalytically upon the metal, which in consequence oxidizes with extreme slowness. Thus iron may be said to be relatively non-corrosive in aërated waters moving at high velocities.

F. It was previously stated that radium emanations cause the gradual precipitation of ferric hydroxide sols, and Dr. Friend states he has shown that under the influence of radium rays iron corrodes considerably less rapidly than otherwise.

In conclusion the writer wishes to express the hope that this article will renew considerable interest in the colloidal theory of corrosion and that in the near future we will be favored by Dr. Friend with further contributions on the subject. The theory is excellent in so far as it accounts for chemical and physical phenomena which effect the rate of corrosion. It starts with the initial oxidation of the iron, but it seems that the electrolytic theory must still apply up to this point. Furthermore, the writer feels that the whole question of corrosion should be attacked nationally, and possibly internationally, so that all corrosion tests might be standardized sufficiently to permit correlation of the results. Wars are fought at great expense in order to cure certain evils with the most probable chance of not obtaining full reparation. Why not then spend a few million dollars wisely toward obtaining a solution of the corrosion problem with the possible chance of saving many millions of dollars and effecting economy in the use of our total iron supply?

National Aniline Wins Appeal

Circuit Court of Appeals Holds Weiss Patent for Vulcanization Accelerator Was Anticipated

A DECISION has just been rendered by the United States Circuit Court of Appeals for the Second Circuit that is of interest to manufacturers of rubber. It was made in the suit of the Dovan Chemical Corporation vs. the National Aniline & Chemical Co., Inc., alleging infringement of a patent for a vulcanization accelerator, decided in favor of the plaintiff in the lower court, but now remanded back by the Circuit Court with directions to dismiss.

The suit was on patent 1,411,231, granted March 28, 1922, to the plaintiff as assignee of one Weiss. On July 2, 1921, Weiss filed an earlier application, for a "process of making diphenylguanidine," a chemical abbreviated throughout the papers as D.P.G. This application also ripened into a patent, No. 1,422,506, on July 11, 1922, also assigned to plaintiff before issue. The present suit was not brought on the latter patent, but its existence has an important bearing on the case.

D.P.G. is a substance long known to chemists, says the court, but produced, before Weiss invented his process, only with difficulty and expense. It was a laboratory and not a chemical product. "This is the assertion of the application of July, 1921, and may be assumed as true for purposes of discussion. Thus, by the date just given at the latest, Weiss conceived that he knew how to produce D.P.G. in quantity and under commercial conditions."

"Defendant," says the court, "has made D.P.G. and sold it to persons who in all probability would use all or most of it in vulcanizing rubber; and especially in preparing tires for motor cars, this being the commercial demand of the day that naturally stimulates inventions such as this one. But, so far as this record shows, defendant's D.P.G. does not infringe Weiss' process for making that chemical; therefore defendant is sued therein as a contributory infringer of No. 1,411,231, which is described in the bill as covering an 'improvement in vulcanization accelerators and in the process of treating rubber, and in the vulcanized rubber compound in which said accelerator is used.'"

The Circuit Court declares the suit to hinge on the answers to two questions—What did Weiss invent? and, When did he make the invention in question? What Weiss claims to have invented, says the court, may be condensed into one sentence: "I claim the use of D.P.G. as an accelerator, because I was the first person who observed its efficacy for that purpose."

"Proceeding to the query as to when Weiss invented," says the court, "the date Sept. 2-6, 1919, is important. On those days the American Chemical Society met in Philadelphia. The meeting was largely attended by chemists. Weiss did not go, but his superior officer (practically his employer) did. At that meeting Dr. Kratz read an essay prepared by himself and his assistants on 'The Action of Certain Organic Accelerators in the Vulcanization of Rubber.' We hold that essay to be a complete disclosure of everything in the application for the patent in suit, and of a great deal more useful and accurately stated information."

This essay was afterward published and the court holds that Dr. Kratz invented whatever Weiss did before the latter had any concept of invention. The court goes on to say: "It is proved by plaintiff's witnesses that Weiss' superior came back from Philadelphia after listening to Kratz's essay and told Weiss and others that he was convinced that 'D.P.G. had a good deal on T.P.G.,'" and ordered Weiss to experiment with it.

Furthermore the court holds that Dr. Kratz in 1917 made rubber tires using D.P.G. as the accelerator and sold them. In conclusion the court says: "It follows that taking this patent at the patentee's own value and accepting, for purposes of decision only, his view of what he invented and how he embodied that invention, Dr. Kratz and associates were ahead of him at every step. Therefore on this record they were the inventors (if any patentable invention exists) and not Weiss."

An Absorption Eccentricity of CO_2

For some time the Bureau of Standards has been working on the absorption of gases and has obtained some very interesting data on the absorption of oxygen in water and of carbon dioxide in sodium carbonate solutions. The result of the latter determination was unexpected and showed that carbon dioxide dissolved less rapidly in normal carbonate solutions than in pure water, in spite of the possibility of the formation of bicarbonates. In order to determine how much of this defect was caused by the viscosity of the absorbent solutions, similar determinations were made of aqueous solutions of sugar having the same viscosity as the sodium carbonate solutions. The effect of the carbonate in decreasing absorption still remained, however.

Hints
That Cut Cost.
Management Puzzles

The Plant Notebook

An Exchange for Operating Men

Practical
Problems of
Plant Operation

Use of Sulphur-Containing Varnish Thinners

By A. L. Brown
Westinghouse Electric & Manufacturing Co.

Many turpentine substitutes and coal-tar solvents used in the varnish industry for thinning purposes contain sulphur sometimes as high as 0.5 per cent. This sulphur often exists in a form that causes precipitation of the lead and manganese driers so extensively used in varnishes and enamels. When the solvent is added to the varnish, the sulphur unites with the lead and manganese driers, forming lead and manganese sulphides, which are very slimy precipitates and rather hard to settle out of the varnish. Moreover, the removal of these driers from the varnish, either wholly or in part, causes the varnish to dry more slowly and consequently defeats the very purpose for which driers are used.

It is the custom with varnish makers to thin their varnishes hot—that is, after the oils, resins and driers have been cooked together until the proper properties have been attained, the hot varnish is removed from the fire and trucked to the thinning room, where the thinners are at once added and the varnish is then allowed to cool. Now the precipitation of the sulphides takes place, according to the writer's experience, only when the varnish is hot. If the varnish is allowed to cool to ordinary temperature, say 20 deg. C., and the solvent, also at room temperature, is then added, no precipitation takes place, or what very slight precipitation occurs is immaterial. This resulted from the experience of the writer in connection with insulating varnishes.

It would be very hard to convince the varnish maker of the advisability of letting his varnish cool before adding thinners. He would say that too much oxidation would go on in the varnish body in the kettle, loss would be occasioned by thick surface skins being formed in contact with the air, etc.

This was avoided in the following way: The varnish kettle had a 2-in. flat flange around the rim. An asbestos gasket was cemented on the flange with waterglass.

THE WRECK OF A DRIED OUT TANK

A quarter-inch circular steel plate was provided which covered the kettle, fitting tight, over the gasket, thus preventing access of air to the varnish body in the kettle. When the varnish was ready for thinning, it was. removed from the fire and the steel plate at once clamped on the kettle. The varnish was then allowed to cool over night. In the morning the plate was removed and only a skin of oxidized varnish had formed on the surface. The cold solvent was then added, no precipitation occurred, and the varnish worked just as well as though it had been thinned hot. This method has been in continual use for almost a year and enables our company to use solvents containing relatively high sulphur content.

In using the above method, a slight change may be made advantageously. Five per cent by volume of sulphur-free solvent is added to the hot varnish before the plate is clamped on. Some of the solvent vaporizes from the hot varnish, and the warm vapor over the surface prevents the formation of any surface skins.

Our company has found the procedure quite valuable, since we have saved at least 20 cents per gallon on our solvents by being able to use them while they still contain a relatively high sulphur content.

Preserve Your Wooden Tanks

Perhaps the experience of a correspondent is unique, but this is doubtful. His business requires the use of a large number of wooden tanks and has used literally hundreds of them in the last 25 years. From the nature of the manufacturing operations many of these tanks periodically stand idle and empty of solution for weeks. It appealed to him as a somewhat elementary suggestion that water be kept in such tanks, and yet the crop of technically trained men which he has had the good fortune (for they were on the whole exceptionally high-caliber men) to employ, have systematically failed to grasp this single elementary idea. Consequently, the manufacturers of wooden tanks have profited to no small extent by the carelessness of these operators.

A wooden tank which does not have water in it soon dries out, the staves separate, and no amount of tightening up on the binding hoops can make the tank as tight as it formerly was. Resort must be had to an expensive process of calking, which at best is unsatisfactory. Our correspondent offered apology for discussing an elementary subject. His apology is unnecessary.

Practical Gasket Hints*

By Henry Bohmer, Jr.
Flexitallic Gasket Co., Camden, N. J.

The greatest difficulty I have encountered during my 10 years experience with gaskets has been to convince users that it is not necessary to tighten a thick flexible metallic gasket with the same extreme pressure as must be applied to thin non-flexible gaskets.

The idea seems to prevail that a gasket, in order to prevent leakage, must have as little thickness as possible and must be squeezed so thin that the distance between the faces of the flanges is a very close approach to absolute zero. Very often when applying gaskets we see the engineer or pipe fitter slip a pipe

over the wrench, thereby increasing the wrench's leverage and making it possible still further to increase the pressure against the gasket. As a result the gasket is squashed. If it is made of corrugated metallic material it is flattened out so flat that the corrugations can do no good whatever. It is poor practice to slip a pipe over *any* wrench on *any* gasket because wrenches are generally made of a proper and safe length to fit the nut for which they were intended, and nut sizes are usually standardized to fit certain bolt diameters. This is a logical safety measure that has been almost universally adopted so that the bolt will not be subjected to too great tension. An extra long-handled wrench, unless used with extreme care, is likely to break the bolt or strip the threads.

One serious objection to the very thin gasket is that no matter how it is constructed it can have but little expanding or contracting capacity, consequently all expansion and contraction must be taken care of in some other manner—by means of pipe bends or expansion joints. A thicker gasket, having elastic properties, will naturally take care of considerable expansion and contraction. In many cases I have known thick flexible gaskets to take care of all of the expansion and contraction in the line—under ordinary temperature conditions of non-superheat practice.

Where temperatures are high, or where temperatures fluctuate considerably, copper, brass and other metallic gaskets having a coefficient of expansion different than that of the joint should not be used. On account of the difference in the coefficient, the gasket and the joint tend to expand and contract independently of each other. The fact that the tightly bolted joint is much stronger than the thin gasket will compel the gasket to expand and contract along with it. Breakage and leakage of a serious nature are, therefore, often the result. A gasket made up of steel that has the same coefficient of expansion as the joint overcomes this latter trouble entirely, but if it is thin and non-flexible it does not overcome or assist in overcoming the longitudinal expansion troubles.

Hence when applying thick flexible metallic gaskets, be certain that a wrench of the correct length is used and then tighten only enough so that the leakage is prevented. Do not tighten too tight. Any further tightening after leakage is stopped simply reduces the elasticity of the gasket and does not give it an opportunity to "breathe" as it should simultaneously with the expansion or contraction of the pipe line.

The matter of tightening the gasket is most important and users of flexible metallic gaskets should exercise caution. By being as careful in tightening the gasket as one is when tightening an ordinary steam engine stuffing box, or when taking up the wear in a bearing, the best results will be obtained.

The Allen Heater for High-Density Solution

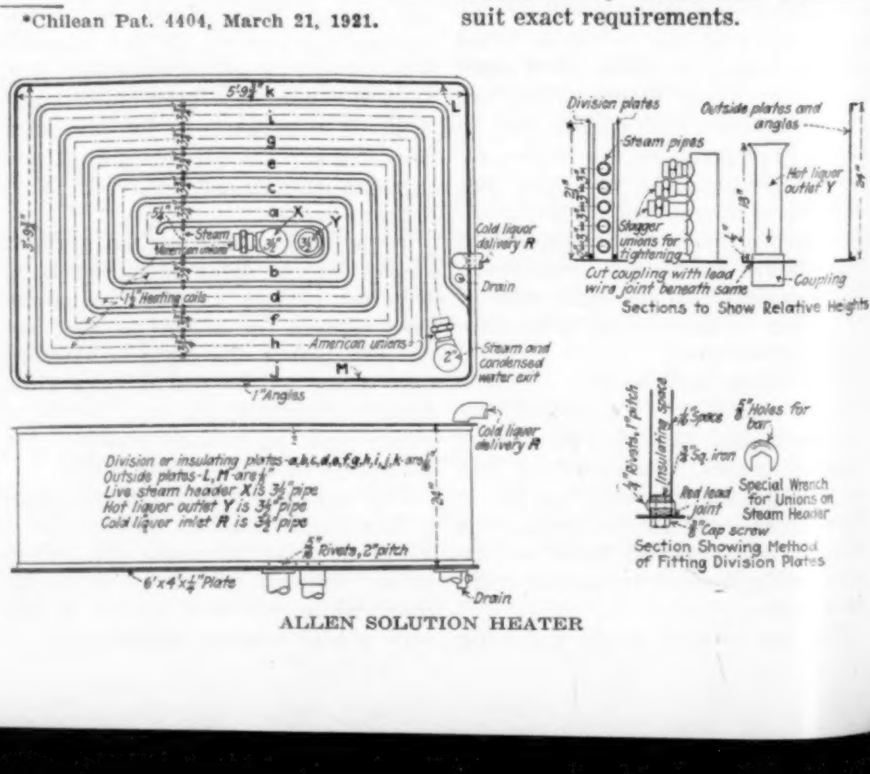
In developing a new hot-solution process for the recovery of nitrate from Chilean caliche, it became necessary to supersede the customary steam-coil method of heating high-density solution in ordinary tanks, with inflow at the top and outflow at the bottom. This practice was inefficient for many reasons. Considerable evaporation was inevitable, with the result that an undesirable concentration occurred. The stagnancy of the solution in contact with the steam coils resulted in local high temperatures, inefficient heat transfer and accretions on the pipes. This led to waste of heat and loss of time in cleaning the coils and tank.

In developing an alternative system it was realized that the efficiency of the apparatus would depend to a large extent on the rate of flow of the steam and the degree of movement of the solution. A countercurrent system suggested itself, the principle underlying the heater* shown in the accompanying cut proving highly satisfactory in the preliminary experimental work (½-ton unit), as well as in the operation of the process on a commercial scale (95-ton units). The apparatus illustrated was made from available scrap material and fittings. Improvements may be possible by modifying the dimensions given, to suit requirements. To illustrate the application of the idea, however, the drawing—of the first unit constructed—will serve.

The cold liquor enters by a delivery pipe (*R*), passes through a narrow channel in the opposite direction to that taken by the steam, and overflows at the hot-liquor outlet (*Y*), in the center of the apparatus. Maximum temperature is reached only when the solution is ready for discharge, so that evaporation is minimized. The hot-liquor outlet is belled, to prevent the vortexing of air in the descending solution.

The relative heights of the outer plates, steam coils, insulating divisions and hot-liquor outlet are shown. A wooden cover was used, which prevented loss of heat, evaporation and the accretion of crystallized salts in the apparatus. A minimum of personal attention was necessary to maintain the effluent liquor at the required temperature—as near boiling as possible; but, as fluctuations in the amount and density of the liquor and in the pressure of steam are usually inevitable under ordinary conditions, it was realized that the cheapest and most efficient method of control would be by automatic regulator, such as the Powers, by which the flow of steam would be controlled by mechanical means to suit exact requirements.

*Chilean Pat. 4404, March 21, 1921.



ALLEN SOLUTION HEATER

Equipment News

Machinery and Appliances for Production and Control

From Maker and User

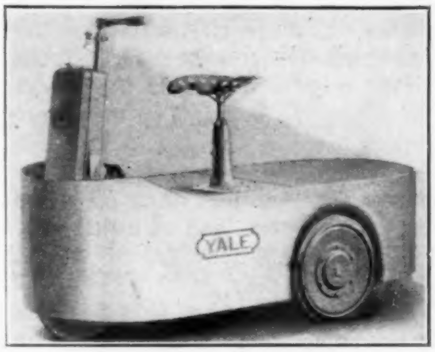
Materials and Accessories for Chemical Industries

New 3-Wheel Tractor-Truck

One of the most useful of a line of industrial storage battery trucks is always the tractor. In recognition of this fact the Yale & Towne Manufacturing Co. of Stamford, Conn., has included a tractor, model K-24, as one of its new "K" line of trucks. This model is also designed for use as a small load-carrying truck for service in the most congested spaces. Its platform area of 15 sq.ft. is 70 per cent of that of the model K-20 platform truck, yet it will pass a 3-ft. doorway or go on a 7-ft. elevator.

The manufacturers consider the low center of gravity of this machine a notable achievement. The common occurrences of "bucking" or overturning against stalling loads, or tipping over sidewise while rounding a corner, are eliminated. The arc-welded frame of heavy pressed steel combines all necessary parts, including battery compartment, bumpers, deck, etc., in a solid, rugged, one-piece structure. It is suspended on helical springs over each wheel. The seat, which is further protected by an additional spring, is of the swivel type. This enables the operator to get on and off the machine with great facility, and to look or reach back to the coupling point. The clear deck gives him perfect vision to the draw bar, so necessary for safe and efficient operation.

The design includes a minimum number of parts, having a maximum accessibility, and grouped into self-contained major units. Most of these parts are the same as have been mentioned in connection with other models of this series and are interchangeable with them. When two or more of this series are used in one plant, this offers a definite operating advantage. It has also served to lower the manufacturing cost and thus to make this tractor-truck an attractive proposition from the standpoint of first cost as well as from the standpoint of utility.



YALE MODEL K-24 TRACTOR-TRUCK

Steel Belt Conveyors

To the Editor of Chem. & Met.:

Sir—Referring to article "Steel Belt Conveyors" appearing in "Equipment News," issue of May 14. The conveyor belt field today is in general covered by fabric belts, which may be of the woven type or the stitched canvas type, and these very successfully carry dry non-abrasive materials. To carry those materials that are wet and extremely abrasive, cotton duck belts having rubber covers suitable for the work are invariably used.

At the present time it is difficult to conceive the use of any but rubber conveyor belting, especially in the mining industry, where the ore handled runs in large pieces and is so very abrasive. The steel bottoms of loading or discharge chutes have to be replaced many times during the life of one rubber conveyor belt. For this service we have experimented extensively to get a cover that was strong and at the same time resilient to withstand this wear, and the results of this work are reflected in the low tonnage costs now being recorded by our Giant and Matchless brand belts.

You will probably recall that some time ago steel flight and drag chain conveyors were used to carry abrasive materials, but the use of these types has been practically discontinued, simply because of the short life and constant trouble they gave. The popularity of rubber belt conveyors is due to their great carrying capacity and at the same time the fact that the power required for their operation is lower than for any other.

To give you some idea of the great carrying capacity of belt conveyors operating on well-designed conveyor rolls or idlers, let us take for example a 48-in. belt traveling at a speed of 400 ft. per minute, which is very reasonable. Under these conditions approximately 30,000 cu.ft. of bulk material can easily be carried each hour, or, to give a better understanding of volume, this is equivalent to over 1,100 cu.yd. per hour.

Having been acquainted with engineering work on conveyors of various types for more than 20 years, I believe this letter truly indicative of my personal views.

D. M. JOHNSON,
Mechanical Engineer,
Conveyor Belt Department,
United States Rubber Co.

Double Action Carboy Pump

A piece of mechanism originally designed for storage battery repair shops and service stations—the double action carboy pump—is now being offered for use in general industry where acid is handled in quantities.

The design and appearance of the pump are well shown in the accompanying illustration. The pump op-

DOUBLE ACTION CARBOY PUMP

erates by forcing air into the carboy and thus displacing acid, which is forced up and out the lead pipe gooseneck. The cut shows the pump being used to fill a battery jar. Each double action stroke delivers one pint of acid.

As an advantage of this pump, it is claimed that a pump on top of a carboy is less apt to be splashed with acid than is a foot pump on the floor. It also saves time in stooping over. The mechanism is so made as to be easily transferred from carboy to carboy. It is made by S. R. M. Orum, Inc., Philadelphia, Pa.

Economy of a Tiering Truck

As a means of testing its new K-22 design of high-lift or tiering truck, the Yale & Towne Manufacturing Co. has been using one of these trucks for some time in its brass foundry. With this truck the company is loading the chipped scrap from the brass castings into box cars for shipment. The scrap is packed into bags of an average weight of 150 lb. and, as can be seen from the illustration, the load consists of 23 to 25 bags per skid. That makes the load from 3,500 to 4,000 lb. for each trip of the truck.

In this operation one truck and three skids are used. There are two men loading skids in the foundry and two men unloading skids in the freight car, and the truck requires one man to operate it. With this crew 60,000 lb. of chipped brass is loaded into a freight car in slightly less than 4 hours over a haul of 175 ft. Practically no lifting is necessary, as the truck goes right inside the freight car and the bags can be tiered as desired.

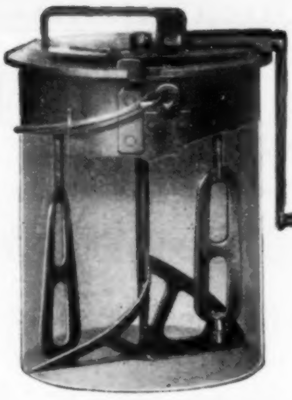
In the former operation of this loading, using man power and two-wheeled stevedore trucks, four men were required in the foundry for loading the bags on the trucks and four more men were used in the freight car for unloading the trucks and piling the bags. Ten men were needed to push the trucks between the foundry and the freight cars. This makes eighteen men in all to perform the work, and with this crew it took a full 8-hour day to load a 16,000-lb. box car.

It will be noted then that five men do the same work in 4 hours by the aid of one tiering truck and three skids that eighteen men formerly did in 8 hours working entirely by hand. That is, 20 man-hours of labor now expended as against 144 man-hours formerly used, giving a saving of 124 man-hours for each box car loaded.

YALE TIERING TRUCK IN ACTION

Hand Mixer for Paint and Other Materials

The Columbia Metal Products Co., of Dayton, Ohio, has recently been incorporated to manufacture mixing apparatus formerly made by the Columbia Engineering Co. The line comprises mixers from a 1-gal. household size to a 500-gal. size for large plants. These mixers are made for paint, lead and oil, and various chemicals, and include a special line of motor-driven mixers for bakeries and confectioneries.



COLUMBIA HAND MIXER

The hand mixer illustrated here comes in 5- and 10-gal. sizes. Its makers claim that its use saves much time, giving as an example the fact that it will mix an amount of lead and oil in 15 minutes that formerly required 2 hours for mixing. Numerous advantages are claimed for this machine, among which are mentioned its portability, hand operation, ease of cleaning, compact design and improved mixing action.

Catalogs Received

TEXAS GULF SULPHUR Co., 41 E. 42nd St., New York City—A leaflet entitled "A New Method of Burning American Crude Sulphur."

NORTON Co., Worcester, Mass.—A booklet entitled "Electric Furnaces for the Laboratory and Their Construction."

AUTOMATIC & ELECTRIC FURNACES, LTD., London, England.—A folder on the automatic electric furnaces built by this company for steel hardening.

COMBUSTION ENGINEERING CORPORATION, 43 Broad St., New York City—A pamphlet describing the type K stoker for operating boilers up to 200 hp. at high capacity and efficiency.

AJAX ELECTROTHERMIC CORPORATION, Trenton, N. J.—Bulletin No. 3. A bulletin describing the 35-kva. converter and small furnaces of the Ajax-Northrup type for temperatures up to 3,000 deg. C.

WESTINGHOUSE ELECTRIC & MFG. Co., East Pittsburgh, Pa.—A new edition for 1923-24 of the Westinghouse supply catalog, being a complete catalog of electrical supplies made by the Westinghouse company. This catalog comprises 1,300 pages of descriptive matter, technical data, dimensions, specifications and prices of interest to central stations, electric railways, industrial plants, mines, contractors, dealers and architects.

YALE & TOWNE MFG. Co., Stamford, Conn., —A pamphlet describing the improved Model 20 electric chain hoist manufactured by this company.

BROWN INSTRUMENT Co., Philadelphia, Pa.—A booklet entitled "The Automatic Control of Temperature in Heat-Treating of Steel." This booklet describes the Brown equipment for automatic temperature control in this industry.

SUPPLEE-BIDDLE HARDWARE Co., Philadelphia, Pa.—The Biddle Metal Bulletin describing a new alloy metal called Everdur and manufactured by the DuPont Engineering Co. of Wilmington.

OTTUMWA BOX CAR LOADER Co., Ottumwa, Iowa—A leaflet describing the box car loader manufactured by this company.

Review of Recent Patents

Improvements in Processes and Patents Feature Fine Chemical Developments

Two New Methods for Dehydrating Alcohol Are Described and Solvent and Byproduct Recovery Processes Outlined

THE complete dehydration of alcohol on a commercially successful scale has been a goal only recently attained by the American chemical industry. Following the interest shown in this development both in this country and abroad there have been many patents for other procedures to accomplish this purpose. Joseph Van Ruymbeke, of Marseille, France, in an American patent issued June 19, 1923, declares that he is able to produce 98-99 per cent alcohol by simple distillation in the presence of glycerine, "which acts as a dehydrating agent."

A counter-current of glycerine is allowed to flow down the alcohol rectifying column, absorbing both water and alcohol so that the alcohol vapors when condensed have a strength of 98 to 99 per cent. The alcohol can be recovered from the glycerine by a second rectification and is passed again to the primary rectifying apparatus. The glycerine when freed from alcohol must be concentrated before it is ready for re-use. (U. S. Pat. 1,459,699.)

Another Method of Dehydrating Alcohol

Anyone who has prepared absolute alcohol, even on a laboratory scale, recognizes that it is impossible to effect a complete recovery of the alcohol, since a portion of it is always retained by the lime. If a sufficiently high temperature is employed to recover all of the alcohol, some decomposition of the hydrated lime results and water passes over with the alcohol.

H. E. Buc, of the development organization of the Standard Oil Co. of New Jersey, has patented a method for the complete dehydration of alcohol, which is effected in the following manner: The alcohol is mixed with 20 to 50 per cent of a suitable hydrocarbon oil, such as kerosene, naphtha, naphtha bottoms, gas oil or the like. Where clean separation of the dehydrated alcohol and hydrocarbon is desired, it may be facilitated by the use of a hydrocarbon oil of materially higher boiling point than the alcohol—for example, kerosene. A slight excess of lime is added to the mixture, which is boiled under a reflux condenser until the dehydration of the mixture is effected. The mixture is then distilled, and if it is desired to collect the alcohol separately, the vapors are suitably fractionated. The alcohol may be completely recovered, since the hydrocarbon oil prevents its adherence or combination with the lime.

If, however, a motor fuel is the ultimate product desired, the dehydrated alcohol and the hydrocarbon oil vapors may be condensed together and the mixture added in proper proportion to gasoline. (1,455,072, assigned, by mesne assignments, to Standard Development Co. Issued May 15, 1923.)

Recovering Ether With a Sulphonic Acid

Many chemical industries, notably the manufacture of smokeless powder and artificial silk, are concerned with the considerable losses of the ether they require for solvent purposes. Various methods have been proposed or are being used for this recovery. One of these involves the use of concentrated sulphuric acid, which at 66 deg. Bé. absorbs something more than its own weight of ether. To recover the ether, however, it is necessary to dilute the sulphuric acid prior to distilling off the absorbed solvent. The reconcentration of this acid is expensive and inconvenient.

Jean Henry Brégeat suggests the use of a sulphonic acid, specifically benzene sulphonic acid, instead of sulphuric acid. The manufacture of this acid is not difficult, especially since it is not necessary to remove the small quantities of sulphuric acid present in the crude product. It is claimed that solutions of benzene sulphonic acid absorb ether with great facility and that a moderate heating of the ether solution thus obtained causes the acid to give up the whole of the absorbed ether in a pure state. (1,455,707, assigned to Bregeat Corporation of America. Issued May 15, 1923.)

Byproducts in Fulminate Manufacture

In the manufacture of mercury fulminate using alcohol, nitric acid and mercury, a considerably quantity of vapor is evolved—equivalent, in fact, to

American Patents Issued July 17, 1923

The following numbers have been selected from the latest available issue of the *Official Gazette* of the United States Patent Office because they appear to have pertinent interest for *Chem. & Met.* readers. They will be studied later by *Chem. & Met.'s* staff, and those which, in our judgment, are most worthy will be published in abstract. It is recognized that we cannot always anticipate our readers' interests and accordingly this advance list is published for the benefit of those who may not care to await our judgment and synopsis.

1,461,745—Process of Purifying Anthraquinone and Its Derivatives. F. W. Atack, Charleston, W. Va.

1,461,777—Centrifugal Separating Machine. F. Koch, St. Paul, Minn.

1,461,801—Apparatus for Charging Reverberatory Furnaces. A. G. McGregor, Warren, Ariz.

1,461,807—Process of Treating Ores. A. Silver, Tonopah, Nev., assignor to Merrill Co.

1,461,831—Process of Manufacturing Compounds Soluble in Water of Diethylbarbituric Acid and Its Homologs. F. Quade, Berlin, Germany.

1,461,840—Apparatus for Humidifying Air. L. E. Vignon, Harare, France, assignor to Les successeurs D'Albert Godde, Bedin & Co., Lyon, France.

1,461,862—Manufacture of Electric-Furnace Linings. W. R. Clark, Bridgeport, Conn., assignor to Bridgeport Brass Co.

1,461,909—Centrifugal Separator. C. B. Jandos, Windsor, Colo., assignor of two-fifths to E. D. De Soto, Denver, Colo.

1,461,918 — Hydrometallurgical Precipitation of Copper. F. Laist, Anaconda, Mont., assigner to Anaconda Copper Mining Co.

1,461,957—Process of Recovering Tin from Impure Ores. H. H. Alexander, Westfield, N. J., assignor to American Smelting & Refining Co., New York.

1,462,003—Impervious Material and Process for Its Production. W. F. Bleecker, Boulder, Colo.

1,462,052—Process for Obtaining Nitric Acid by Means of the Electric Arc in a Closed Cycle. W. Siebert, Laufenburg, Switzerland, assignor to Nitrum Aktiengesellschaft, Zurich, Switzerland.

1,462,064—Process for the Production of Sodium Decaborate From Boron Ores. A. A. Kelly, London, England.

1,462,068—Process of Treating Hydrocarbon Oils. L. H. Manning, Tucson, Ariz.

1,462,074-5—Detonator. W. O. Snelling, Allentown, Pa., assignor to Trojan Powder Co., New York.

1,462,111—Magnetic Separator. A. F. Jobke, Pittsburgh, Pa.

1,462,143—Method of Cracking Hydrocarbon Oils. F. T. Manley, Houston, Tex., assignor to Texas Co., New York.

1,462,175—Filtering Means for Lubricating Systems. E. E. Hans, Kalamazoo, Mich.

1,462,177—Method of Cooling Air. A. Messer, Frankfort-on-the-Main, Germany.

1,462,194—Drying Kiln. C. A. Cutler, Buffalo, N. Y.

1,462,236—Composition for Varnish. R. S. Lloyd, Maysville, N. C.

1,462,243—Soap. P. L. E. Pech, Narbonne, France.

1,462,247 — Treatment of Hydrocarbons. W. F. Rittman, Pittsburgh, Pa.

1,462,284—Method of Making Hydrated Lime. M. Hermann, New York.

1,462,306—Plasticizer for Cellulose Plastics. A. D. St. John, Maplewood, N. J.

1,462,335—Apparatus for Treating Gasoline. T. A. Gross, Frederick, Okla.

1,462,363—Method of and Apparatus for Making Spray From Liquids and Commingling the Same with Gases. C. Christensen, Salt Lake City, Utah.

1,462,418—Washer for Classifying Coal, Minerals or the Like. I. Malecot, Grand Croix, France.

1,462,421—Electrolytic Treatment of Metalliferous Materials Containing Metals of the Chromium Group. R. E. Pearson, London, and E. N. Craig, Ham Common, England.

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

about half the weight of the raw materials used. After condensing, a liquor of the following composition is obtained: Ethyl nitrite, 35 per cent; ethyl formate, 16 per cent; ethyl alcohol, 30 per cent; water, 10 per cent, and aldehyde, 5 per cent. In the past alcohol was practically the only constitutent of this mixture that was recovered commercially.

An improvement on methods previously proposed for separating these materials is claimed in a recent patent of Robert C. Moran, which is assigned to E. I. du Pont de Nemours & Co. He treats the condensate with a 30 per cent NaOH solution while cooling it to below 20 deg. C. in order to saponify the ethyl formate. After the mixture stratifies, the ethyl-nitrite-alcohol mixture is decanted and hydrolyzed by heating with water and caustic soda at a temperature above 70 deg. C. The alcohol is finally separated from the sodium nitrite solution by simple distillation. (1,459,410, issued June 19, 1923.)

Peroxides in Synthetic Camphor Production

What appears to be an extremely simple method for the production of camphoric acid and camphor has been described in two patents recently issued to W. T. Scheele and assigned to H. Mortimer Specht of New York. A 10 per cent solution of sodium peroxide in absolute alcohol is autoclaved with completely dehydrated pinene. After an energetic action a product is obtained which when treated with water yields camphoric acid. (1,458,992.) This may be reduced to camphor by any suitable means; the one suggested in the author's second patent is the use of finely divided iron. (1,458,993; issued June 19, 1923.)

Separating Solids From Liquids

Some Recent Patents Covering This Important Unit Process of Chemical Engineering

THE PROCESS of removing solids from liquids by means of settling tanks has long been of paramount interest to many industries. It is therefore with little surprise that we note the amount of effort now being expended to provide new devices for this purpose, as reflected in recently issued patents. One of these devices (1,457,794, W. E. Piper, assignor to the Dorr Co., of New York City, June 5, 1923) is concerned with apparatus intended to remove solid material from settling tanks.

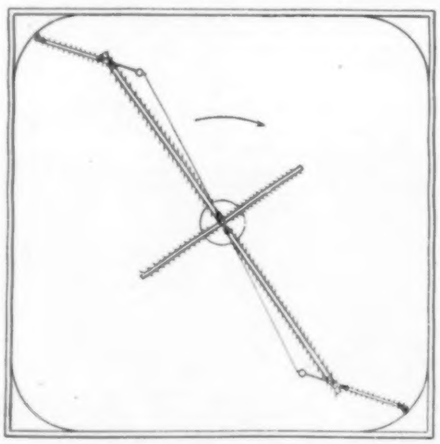
It has been customary to use cylindrical tanks as settling tanks because this permitted the use of rotating scraper arms for removing the settled material. These scrapers consisted of arms with plows attached, supported on a vertical rotating shaft. This was an inexpensive method of removing the solids, but was not applicable to square or rectangular tanks, which tanks are more economical of floor space and often must be used.

In the present invention auxiliary pivoted arms have been attached to the rotating scraper arms, as shown in the illustration. These auxiliary arms move over the space outside the path of the fixed arms and so permit the whole surface of a square tank bottom to be covered by the scraper. For a rectangular tank, two or more sets of rotating arms may be employed.

Separation by Evaporation

An apparatus for the purpose of separating solids from liquid where the liquid is evaporated and the solids are deposited in powdered form has been patented by A. J. White, of San Antonio, Tex. (1,457,803, June 5, 1923). This apparatus introduces the liquid in an atomized form into a desiccating chamber. At the same time it is heated so as to vaporize the moisture, which is allowed to escape, while the solid particles, in a powdered condition, are deposited and collected in the bottom of the chamber.

In order to atomize the liquid, compressed air is used to spray it into the desiccating chamber. This air is dry and is heated to a suitable temperature, depending on the liquid to be treated. Further heating, to accomplish evaporation of the moisture, is accomplished by the use of another



and more highly heated stream of dry compressed air, introduced into the chamber in such a way as to mix thoroughly with the atomized liquid and thoroughly desiccate it.

Separating Minerals From Water

In various industrial operations water bearing various finely divided minerals is encountered. At times it is desired to remove these so as to obtain pure water for re-use, while at other times the recovery of the minerals is desired. In either case a recent patent is of interest (1,458,234, H. C. Miller, assignor to the Standard Oil Co. of California, June 12, 1923).

In this method, the liquid containing the solid matter is discharged into a hopper. This hopper has an outlet provided with a check valve. This outlet empties into the separating chamber. The separating chamber is a long cylindrical vessel mounted at an adjustable angle. The inlet is near the lower end, on the top surface.

The discharge is at the lowest point of the cylinder and is through a flexible pipe so that it empties in turn into a launder which may be raised or lowered at will. There is also a discharge at the upper end of the cylinder which delivers over a separating baffle into a launder.

Near the inlet and pointed up the cylinder toward the inlet at an angle is a nozzle for the admission of compressed air. This nozzle is provided with a perforated end plate. Air is admitted, at a higher pressure than the static head of the liquid in the cylinder, in the form of jets through the perforated plate. This serves to form many bubbles which pass up the incline of the cylinder. This procession of bubbles sets up pulsating currents which cause the solid particles to migrate toward the lower end of the cylinder, while the cleaned liquid discharges through the upper outlet, the concentrated solids and some liquid passing out at the lower outlet.

Book Reviews

The Motor Fuel Problem From Many Angles

MOTOR FUELS: Their Production and Technology. By *Eugene H. Leslie*. 681 pp., illustrated. New York: The Chemical Catalog Co., Inc., Price, $7.

Because of the manner in which this work has been prepared, it should appeal to a variety of readers. The author states that the non-technical reader who is not concerned with the principles of distillation, fluid flow or the thermal decomposition of hydrocarbons may find something of interest in the motor fuel situation, the general processes used in petroleum refining, the quality of motor fuels and the future of alcohol; the student who knows little or nothing of refining technology will be interested in the general as well as the descriptive matter essential to the gaining of a picture of the industry—and, finally, the refinery engineer may find considerable help in the presentation of the principles of distillation, fluid flow, heat transfer, thermal reactions of hydrocarbons and refining.

No one reading the first chapter can help but be impressed with the importance of our motor fuel problems. Tables and charts show the trend of consumption and production along with the production of vehicles, and indicate the inadequacy of our petroleum reserves. The second and third chapters deal with the composition and the general outline of the process of handling petroleum.

Chapter IV covers in a simple, under-

standable manner the problem of fractional distillation. Involved mathematical discussions have been avoided. While this may be criticised by some of the more profound students of the phenomena, the terminology and formulas will be welcomed by the refinery engineer.

Available data on fluid flow, and particularly heat transfer, are inadequate, and the author should make his plea stronger for the publication of more reliable work and data in this very important field.

The next two chapters give considerable general information concerning the equipment used in the distillation and refining of petroleum. The latter chapter on fractionators, heat exchangers and condensers will be of particular interest and help to the practical refiner.

The critical review of the various cracking processes given in Chapter IX is enlightening; while not complete, the chief points of the more important processes are discussed. Usual refinery practice in the chemical treatment of gasoline and the production and refining of natural gas gasoline are described at length in Chapter X and XI.

In the two following chapters, a very readable and interesting discussion is given of the blended fuel and the importance of alcohol in solution of the motor fuel problem. The advantages and disadvantages of alcohol fuels are given and the various raw materials for the production of alcohol mentioned. The success of composite fuels is due to their many points of advantage, but, as the author points out, they can be but a "drop in the bucket" as compared to our total motor fuel requirements.

The latter part of the book, being devoted to specifications, methods of analyses and tables of physical data, will be of service to the petroleum chemist.

The experience of the author in the scientific, academic and practical phases of the petroleum industry with those in the specialized field of alcohol and blended fuels enabled him to select with discrimination the essential material for such a treatise. His fearless attitude and expressed purpose of meeting each situation "squarely" gives the book an interest greater than the mere presentation of material from the literature. The opinions of the author leave no one in doubt as to the issue, and students as well as refiners will find the book most helpful.

B. R. TUNISON.

Inorganic Lab Manual

LABORATORY EXERCISES IN INORGANIC CHEMISTRY. By *James F. Norris*, professor of organic chemistry, Mass. Inst. Tech., and *Kenneth L. Mark*, professor of chemistry, Simmons College. 548 pages, alternate pages blank for notes. New York: McGraw-Hill Book Co. Price, \$2.

This laboratory manual contains the usual run of experiments generally recommended to students in general elementary chemistry. The authors, however, have introduced a novelty by the inclusion of a few representative experiments in simple quantitative analysis. While this departure from the usual practice in this sort of a text book does not by any means put the book in a class of quantitative analysis handbooks, it does show a decided step in advance in teaching methods. It has always been the principle of the writers that the student's early training should not only be designed to develop his power of observation and and deduction but should introduce to him the workings of the laws of definite and multiple proportions in such a way that they become second nature to him. Too often these all-important fundamentals in a science of chemistry are regarded by the student as a more or less vague statement which may be found on page so and so of the book and which means nothing.

Most courses in general chemistry are mainly exercises in penmanship. The student devotes his energy and interest to preparing a neat and impressive note book to be graded at the time of the final examination, but, to quote the cartoonist, "It does not mean anything." The manual under review has a number of blank pages distributed throughout the text for the recording of the student's observations. With the aid of the questions and suggestions in the manual, these blank pages can be filled out by the student in such a manner that at the conclusion of the course he will have a valuable and permanent reference book.

The practical side of the laboratory experiment is not overlooked in this work. The student is early shown the practical application of his laboratory work by such experiments as the qualitative analysis of Old Dutch Cleanser. Obviously, the young seeker for knowledge will be more interested in discovering the composition of a product which he has seen used all his life and which he knows has made a fortune for its inventor than in testing the powder or solution which was concocted haphazard by his instructor from the mysterious assortment of bottles on the office shelf. Examples such as this one will bring up in the minds of the student and instructor alike many other substances in everyday life which may be adapted very easily to laboratory investigation.

The idea of taking up the properties of the metals and the study of some of their simple salts and methods for testing their purity will always be of value in quickening the interest of the student in his work. As an introduction to qualitative analysis, this work is of prime importance, as a thorough grounding in the properties of metals and metallic salts will leave the student free to study the new principle presented by quantitative analysis without requiring him to learn all over again the simple fundamental reactions.

The questions accompanying each experiment in the text are searching and thorough. If the answers to them are diligently sought by actual test and by reference to the text, then at the conclusion of the course the student will have built a foundation for chemical training so substantial that the superstructure built on it will be of the highest order of perfection. Every phase of chemistry is carefully covered. We find studies of gases, liquids and solids; solutions, thermochemistry and electrochemistry, chemical equilibria, oxidation and reduction. Scores of experiments showing the application of chemistry to everyday life in the world of commerce and manufacture.

It is a wholesome sign to find a Man-

Important Articles in Current Literature

More than fifty industrial, technical or scientific periodicals and trade papers are reviewed regularly by the staff of *Chem. & Met.* The articles listed below have been selected from these publications because they represent the most conspicuous themes in contemporary literature, and consequently should be of considerable interest to our readers. A brief résumé of each article is included in the reference given. Since it is frequently impossible to prepare a satisfactory abstract of an article, this list will enable our readers to keep abreast of current literature and direct their reading to advantage. The magazines reviewed have all been received within a fortnight of our publication date.

BYGONE CHEMICAL TECHNOLOGY. J. R. Partington. A review of the recent book of Gustav Fester brings out many interesting bits of early chemical history. *Chem. & Ind.*, June 29, 1923, pp. 636-41.

THE EVOLUTION OF A CHEMICAL INDUSTRY. Charles Carpenter. The beginnings of coal distillation and the metamorphosis of the coal-tar industry are reviewed. *J. Soc. Chem. Ind.*, July 6, 1923, pp. 289T-94T.

PROCEEDINGS OF THE INTERNATIONAL CONGRESS OF LIQUID FUELS, held in Paris, October, 1922. An attractively illustrated volume of 846 pages giving detailed accounts of all papers presented and discussion at various technical sessions on gasoline, shale oil, coal tar and benzol, alcohol and vegetable oils. *Chimie et Industrie*, special number, May, 1923.

COKE QUALITY AND BLAST-FURNACE OPERATION, PART II. F. W. Sperr, Jr. and D. L. Jacobsen. The relation of coke consumption to combustibility. *Blast Furnace & Steel Plant*, July, 1923, pp. 378-383.

HEAT BALANCE OF CARBONIZATION PROCESS. J. K. Munster. A balance worked out for the process as accomplished in the modern byproduct, high-temperature oven. *Blast Furnace & Steel Plant*, July, 1923, pp. 389-392.

SUR L'ESSAI À LA SCORIFICATION DES MATÉRIAUX RÉFRACTORIES. P. Gilard, A description of the methods used in testing refractories to determine their resistance to scorification. *Revue Universelle des Mines* (Liége), July, 1923, pp. 1-7.

AN INSTALLATION FOR HEAVY FUEL OIL. W. C. Buell. A description of heating furnace equipment designed to avoid the high cost and limitation in supply of light fuel oils. *Iron Age*, July 1923, pp. 129-132.

STEAM AND POWER WASTE IN BOXBOARD MAKING. Morgan G. Farrell. An exposition of conditions in a typical boxboard mill, showing where considerable economies could readily be effected. *Paper Trade Journal*, July 19, 1923, pp. 43-46.

RUBBER SOLVENTS. Ismar Ginsberg. An outline of the uses of various possible rubber solvents pointing out advantages as well as disadvantages, with special reference to recent developments. *Rubber Age*, July 10, 1923, p. 264.

ual of Laboratory Exercises of Inorganic Chemistry which takes for granted that the student has had some training in chemistry and in thinking before he undertakes his work in college and gives him credit for a fair amount of gray matter.

ALPHA A. DIEFENDERFER.

Lead in the Analytical Laboratory

CHEMICAL ANALYSIS OF LEAD AND ITS COMPOUNDS. By *John A. Schaeffer, Ph.D.*, vice-president and chief chemist, Eagle-Picher Lead Co., and *Bernard S. White*, assistant chemist and general superintendent of the Joplin plant. Second edition, revised and enlarged by *J. H. Calbeck*, director of research, Eagle-Picher Lead Co. 160 pp. Chicago: The Eagle-Picher Lead Co. Price, $1.

From the multiplicity of analytical methods for lead and its compounds to be found in the literature, those that best combine extreme accuracy with rapidity of manipulation have been selected and compiled in book form for the convenient guidance of others interested in this field. That a second edition has been required is evidence of the demand for this work, which covers the analysis of lead ore, sublimed white lead, sublimed blue lead, zinc oxide, lithopone, red lead and orange mineral, litharge, basic carbonate of lead, pig lead, spelter, and alloys of lead, tin, antimony and copper. Other chapters cover a colorimetric method for the determination of copper and iron in pig lead, lead oxides and lead carbonate, electrolytic deposition of lead, and physical properties of pigments. As it represents the methods adopted by the leading laboratories in the lead districts, the book should prove indispensable to anyone interested in these products.

A. G. WIKOFF.

Calendar

AMERICAN CERAMIC SOCIETY, summer meeting, Toledo, Detroit and vicinity, Aug. 8 to 11.

AMERICAN CHEMICAL SOCIETY, fall meeting, Milwaukee, Wis., Sept. 10 to 14.

AMERICAN ELECTROCHEMICAL SOCIETY, forty-fourth meeting, Dayton, Ohio, Sept. 27 to 29.

AMERICAN GAS ASSOCIATION, annual convention, Atlantic City, Oct. 15 to 20.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, INC., Ontario and Quebec, Aug. 20 to 31.

AMERICAN MANAGEMENT ASSOCIATION, Hotel Astor, New York, Oct. 29-31.

AMERICAN MINING CONGRESS, Milwaukee, Wis., Sept. 24 to 27.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, annual meeting, New York City, Dec. 3 to 6.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, annual convention, New York City, Dec. 3 to 5.

ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS, iron and steel exposition, Buffalo, N. Y., Sept. 24 to 28.

NATIONAL ASSOCIATION OF PRACTICAL REFRIGERATION ENGINEERS, fourteenth annual convention, Memphis, Tenn., Dec. 12 to 16.

NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES (NINTH), New York, Sept. 17 to 22.

NATIONAL SAFETY COUNCIL, twelfth annual safety convention, Statler Hotel, Buffalo, Oct. 1 to 5.

New Publications

PRODUCTION OF AIR-DRIED PEAT. Section 1 of the Report of the Fuel Research Board (British) for the years 1922-23. Available only by purchase from His Majesty's Stationery Office, Imperial House, Kingsway, London, W. C. 2, at 5s. 3½d., post free. The report includes discussion of mechanical handling, air-drying and related subjects as developed in both England and Canada.

NEW U. S. GEOLOGICAL SURVEY BULLETINS: I: 2, Gold, Silver, Copper, Lead and Zinc in the Eastern States in 1922, by J. P. Dunlop (Mineral Resources of the U. S., 1922, Part I), published June 12 1923: II: 2, Peat in 1922, by K. W. Cottrell (Mineral Resources of the U. S., 1922, Part II), published May 31, 1923; II: 31, Petroleum in 1919-1921, by G. B. Richardson (Mineral Resources of the U. S., 1921, Part II), published May 26, 1923; II: 33, Coke and Byproducts in 1921, by R. S. McBride (Mineral Resources of the U. S., 1921, Part II) published June 14, 1923.

THE GENERAL ELECTRIC CO., Schenectady, N. Y., gives in a 34-page booklet, just issued, a review of 30 years' history, from its foundation in 1892 to 1922. Tracing the development of the electrical art which grew out of the early pioneering work of the Edison General Electric Co. and the Thomson-Houston Electric Co., the astonishing growth of the business, the rapid increase in the size of generating units, steam turbines and the ever widening application of electric power and human speeds is pictured. Twenty-three illustrations of electrical progress and progress in industrial relations add further interest to the text, which follows the course of the company's activity by citing milestones of electrical development for which it was so largely responsible. Thus the following headings give an idea of what the book contains: "Large-Scale Tower Generation," "Power On the Sea," "The Trackless Trolley," "At the Panama Canal," "Contributions to Long-Distance Wireless Communication," "Lightening Home Burdens," "Far-Reaching Aid to Medical Science," "Progress in Illumination," "A Great Necessity at a Small Expense," "One Million Volts," "Prices Increased Less Than the Average," "How G-E Money Is Spent," "Opportunities for the Future." The booklet is issued on behalf of the directors by Owen D. Young, chairman, and Gerard Swope, president.

NEW U. S. BUREAU OF MINES PUBLICATIONS: Tech. Paper 339, Coal-Mine Fatalities in the United States, 1922, by William W. Adams; Bull. 204, Underground Ventilation at Butte, by Daniel Harrington.

Men in the Profession

F. R. BLAYLOCK has resigned his position as associate chemist in the Bureau of Mines to accept a position in the refinery of the Marland Refining Co. of Ponca City, Okla.

LAWRENCE H. BROWN, who was until recently connected with the Edwin M. Knowles China Co., at Newell, W. Va., is now located with the Findlay Electric Porcelain Co., Findlay, Ohio.

A. F. GREAVES-WALKER, president of the American Ceramic Society and lately ceramic engineer for the American Refractories Co., Pittsburgh, Pa., has acquired an interest in the Stevens Brothers Co., Atlanta, and Stevens Pottery, Atlanta, Ga., and will located permanently in that city.

R. V. HEUSER has opened a consulting office and laboratory at 516 Hawthorne Ave., Newark, N. J., for the investigation of chemical plant problems.

Dr. M. E. HOLMES has resigned from the office of chemical director of the National Lime Association. Dr. Holmes was appointed as head of the chemical department of the association in October, 1920. He is a graduate of Indiana and Cornell universities. Dr. G. J. Fink, who has been Dr. Holmes' associate on research work for the association, has been appointed head of the chemical division.

S. P. HOWELL, formerly of the Pittsburgh Station of the U. S. Bureau of Mines, who has spent the past year in Arizona studying the mining problems of that state, especially regarding the use of explosives, has been designated as superintendent of the station at Tucson.

E. R. HOWELLS, metallurgist for the Bethlehem Steel Co. at its Steelton, Pa., works, has been appointed assistant superintendent of the steel foundry at the plant, succeeding W. W. Cooper, who has been appointed superintendent.

ALEXANDER J. MCKAY, who for the past 10 years has been vice-president and general manager of the Combined Locks Paper Co., at Appleton, Wis., has been elected vice-president and assistant to the president of the Seaman Paper Co., Chicago, Ill.

D. D. MOFFAT, consulting engineer for the Utah, Ray Consolidated, Chino and Nevada Consolidated Copper companies, Salt Lake City, Utah, associated, has been appointed assistant to L. S. Cates, vice-president and general manager of the Utah Copper Co.

D. MORGAN, of the technical staff of the Cosden Co. of Tulsa, Okla., is in New York City on business and is making his headquarters at the Hotel Pennsylvania.

ARTHUR SCHROEDER, formerly doing research work for the Universal Oil Products Co., New York City, is now associated with Albert Schwartz of Newark, N. J., in experimental and research work on petroleum.

JOHN D. SULLIVAN, analytical chemist at the Northwest Experiment Station of the U. S. Bureau of Mines, Seattle, Wash., has been transferred to a similar position at Berkeley, Calif., which was formerly filled by K. S. Boynton, resigned.

PAUL TEETOR, formerly ceramic engineer with the State Geological Survey, Lawrence, Kan., is now located with the Mutual Potteries at Trenton, N. J.

Obituary

N. E. LOOMIS, general manager of the Mosaic Tile Co., Zanesville, Ohio, and an expert in fine ceramics, died suddenly July 13 at the age of 67 years. His death is believed to have been due to heart disease. He had been connected with the Mosaic Tile Co. for many years.

Industry and Trade

Current News and Market Developments

Summary of the Week

Production of potash in the United States last year was 25,176 short tons, containing 11,714 tons of actual potash.

Bill passed by Argentine House of Deputies proposes substantial increases in duties on goods imported into that country.

News reports announce the seizure of another German chemical plant by the French.

Leading soap company announces that its employees will be guaranteed 48 weeks employment per year.

Imports of chemicals in June were valued at nearly $4,000,000 less than the total imported in May.

Federal Trade Commission rules that sale of shellac substitute, without clearly indicating ingredients, is unfair.

Tariff Commission has ordered public hearing Sept. 10 on application for higher duty on nitrite of soda.

American consumers are invited to bid on 50,000 lb. of dyes seized at plants in the Ruhr.

Production of acetate of lime and methanol was larger in May than in April.

Chilean Government opposes nitrate of soda producers' demands for higher prices on that product.

Canadian pulpwood embargo situation looks brighter. No immediate action expected.

Sales of barytes mined in this country in 1922 amounted to 155,000 tons, which was more than twice as much as in 1921.

Foundation trial at Wilmington, Del., ends.

Chemical Imports in June Show Marked Decline in Value

Exports Were Slightly Lower Than in May, but Were Larger Than in June, 1922

A SLUMP of nearly $4,000,000 in chemical imports during June as compared with May is the outstanding feature of the June figures, which have just been compiled from the returns to the Department of Commerce. In May imports of chemicals and allied products were valued at $11,568,833. In June the total fell to $7,662,063. The decrease, however, was not in the coal-tar group. It was made up largely of fertilizers, but in addition was spread quite generally throughout the list.

There was an increase in the quantity of white arsenic imported. High prices for this chemical and reports that the home production would prove too small account for the increase in arrivals of arsenic, as practically all countries were called upon to furnish stocks. In view of the widespread interest which has been shown in arsenic, imports for the first half of the year are shown below:

	Lb.		Lb.
Jan.	1,879,639	April	1,475,066
Feb.	2,115,339	May	2,118,338
March	1,392,289	June	2,365,475

Coal-Tar Imports

The June imports of coal-tar chemicals were valued at $1,556,015. This was only $90,000 less less than imports in May. On the other hand, May imports of fertilizers were valued at $5,997,387. In June the total fell to $2,492,200. Incidentally that total is more than $1,000,000 less than the total imports in June of 1922. The decrease is chargeable almost entirely to sodium nitrate, which fell to one-quarter of the May volume. There were decided increases in the receipts of calcium cyanamide and of sulphate of ammonia. The same condition prevailed among the potash fertilizers. The receipts of muriate were 11,730 tons, as compared with 3,466 tons in May. Paints, pigments and varnishes imported in June were valued at $290,093, a decrease over imports during May and during June of 1922. Imports of explosives continued to be negligible. Some significant comparisons are as follows:

	June, 1922 Lb.	June, 1923 Lb.
White arsenic	....	2,365,475
Sulphuric acid	....	2,440,360
Chloride of ammonia	898,561	134,267
Nitrate of ammonia	....	448,153
Arsenic sulphide	283,747	2,150
Bleaching powder	4,336,572	....
Cyanide of soda	519,958	3,911,795

Exports of chemicals and allied products in June were slightly less than in May, but exceeded those of June, 1922, by $2,500,000. There was a falling off of about 6,500,000 lb. in the exports of sodas and sodium compounds, as compared with May.

Caustic Soda Exports Decline

Caustic soda has shown a decline in exports every month this year as compared with the totals for the corresponding months last year. For the first 6 months of last year exports reached a total of 89,607,806 lb. whereas the grand total for the first half of the current year were but 58,703,050 lb. This means that outward shipments of caustic soda have been less than two-thirds as large as in the first half of 1922. Exports according to months were:

	1923 Lb.	1922 Lb.
January	7,891,279	10,917,529
February	7,405,064	12,469,192
March	9,855,416	18,612,225
April	12,284,777	15,017,777
May	11,269,945	21,235,175
June	9,996,569	11,355,908

Pigments, Paints and Varnishes

Exports of pigments, paints and varnishes increased. The value of those products exported in June aggregated $1,665,217. About 13,000 tons less of fertilizer materials was shipped out of the country during June. Explosives exports, however, increased by nearly 1,000,000 lb. Exports of sulphate of ammonia decreased from 24,169 tons in May to 13,187 tons in June.

Some of the details of the export movement in June as compared with that of the corresponding month in 1922 follow:

	June, 1922 Lb.	June, 1923 Lb.
Acetic acid	1,032,081	70,532
Sulphuric acid	2,481,290	386,573
Boric acid	301,244	55,844
Ammonia	361,760	297,858
Aluminum sulphate	2,095,601	3,462,779
Calcium carbide	853,546	633,578
Cyanide of soda	17,418	920,830
Borax	1,633,602	2,270,197
Soda ash	1,898,908	2,464,540
Caustic soda	11,355,908	9,996,569
Carbon and lamp black	1,107,364	2,826,045

News Notes

Syracuse, N. Y., is to be the scene, from Oct. 5 to 13, of an unusual exhibit of machinery which is at least partly of chemical engineering character. The national dairy exposition which is to be held there is to include a full installation of the machinery required for the operation of a modern milk plant, a condensed milk plant, a creamery, cheese, and ice cream factory.

The Mattagami Pulp & Paper Co., Ltd., is now producing to full capacity at its plant at Smooth Rock Falls, Ont., turning out 150 tons of unbleached sulphite pulp daily. William Ellis, formerly of the New York division of the International Paper Co., is superintendent of the plant and is making a number of improvements. The work of relining one of the digestors has been completed.

Stainless silver appears to be a reality in England. A communication from that country states that William Turner & Co. are producing such an alloy with remarkable results. The trade name of the material is "Silanca," and it is understood that it carries more than 92.5 per cent of the pure metal silver. Silanca has no fire mark and cannot be electroplated.

An accurate estimate of the amount of gasoline in the wet gas from the well of the British Petroleum Co. near Wainwright was recently made at the University of Alberta and the report was highly satisfactory. This well blew in 2 months ago with an estimated flow of 6,000,000 cu.ft. per day. The tests of gas from the well gave a return of almost 3 gal. of gasoline per thousand cubic feet of gas.

Conditions in the steel industry of Canada are favorable, aside from the situation in which the British Empire Steel Corporation is involved. Labor troubles there will tend to prevent any immediate reduction of prices of iron and steel. Orders for locomotives and rolling stock are being filled as rapidly as the delivery of cast iron and steel will permit.

Sulphate of ammonia has become one of the steady exports shipped out of Birmingham, Ala., from the several big byproduct plants. Large tonnages of this product are going to Japan and China, along with Birmingham steel rails, plates and other steel products.

R. H. Macy & Co., New York City, are establishing connections with a research laboratory for the purpose of determining and testing the materials in the various types of merchandise handled by the store. It is understood that special attention is to be paid to fiber silk, partly with the idea of developing a new name for this commodity.

Will Bienfait Lignite coal give satisfactory results on combustion? To decide definitely as to the advisability of continuing or abandoning the experiments in connection with this coal, a conference of the Dominion, Manitoba and Saskatchewan governments will be held in Winnipeg, Man., on July 30, it was announced last week. These experiments carried on at Bienfait, Sask., during the past 5 years, have cost about $1,000,000.

The Southern California Section of the A.C.S. is holding occasional summer sessions. On July 26 a considerable gathering was on hand for a talk by Dr. J. Lash Miller, eminent physical chemist, on "The Willard Gibbs Method in Chemical Thermodynamics."

Fourteen chemical engineers who attended the Wilmington convention established a firm hold on fame by playing golf in public. Moreover, "a good time was had by all." F. I. Gibson won the silver cup which was given in recognition for superior ability at pill chasing, although F. M. DeBeers made it a close game. Several other chemical engineers proved that they were no mean artists on the turf.

Plans are now well advanced for the construction of an addition to the Brandram-Henderson varnish plant at Montreal. The new building will be devoted entirely to the production of varnishes and enamels. When completed, this additional plant will be one of the most modern and best equipped of its kind in Canada.

The Pennsylvania Bureau of Chemistry and Department of Agriculture has compiled statistics showing a total collection of $74,712 from fees and fines paid into the State Treasury as a result of the work of the bureau during the first 6 months of the present year. The expenses of the bureau during this period were $24,108.53, or less than one-third of the amount received. More than 2,900 analyses have been made in this time.

Canada Evinces Caution

Pulpwood Situation More Promising From United States Viewpoint—Royal Commission to Investigate Situation

CANADA is considering the pulpwood embargo question carefully. At an address at the opening meeting of the British Empire Forestry Association's convention at Ottawa on July 25, Premier King announced that the government hoped to avoid placing the embargo. His speech contains many points of interest to those who have been following the pulpwood situation recently.

"The government hopes to avoid placing an embargo on pulpwood. We recognize that to restrict trade in any direction is the last of measures to which a government should resort. We are hopeful that in the benefits which will accrue to our forests from association, consultation and conference with forestry exports from other parts of the British Empire as well as from the information which we hope our own Royal Commission will elucidate, we may yet find a more excellent way of dealing with the problem of economic development of our forest resources. We recognize that in the haste of development we have been profligate with our forest wealth, that we have wasted our heritage and that while we have been proficient in utilization we have been deficient in preservation. It is just such evils as these that we hope this conference will go far to remove."

The coming inquiry by a Royal Commission into the question of exportation of pulpwood from Canada, and particularly any action which may be based upon it, is becoming a question of international concern, judging by the interest which is being displayed. W. S. Fielding, Minister of Finance, is now framing up the personnel of the Royal Commission which will inquire into the whole question. It will be appointed early in August. The main arguments in favor of prohibition are the conservation of pulpwood resources and the manufacture at home of raw products.

On the other hand, it is felt by many that a very heavy international trade would be restricted, if not entirely done away with, and there are suggestions, taken seriously in some quarters, of United States reprisals. Before any such complications develop there will be a thorough inquiry.

If any of the power now vested in the government is invoked there is much to suggest that the exercise of it will be sparing and inordinately cautious. Cognizance is taken in this country over the evidence given by United States paper companies that they are greatly perturbed over the potentialities of prospective developments, and all this is tending to cause the government to move slowly and carefully.

Chilean Government Opposes Advance in Nitrate Price

No advances in the price of nitrate of soda are likely to take place in the near future. The Chilean Government apparently has taken a very decided stand in the matter. In the face of a very insistent demand on the part of the producers for higher prices to offset the higher exchange value of the Chilean peso, there was no altering of the government's position. As a result, it is said, price was not discussed at the June 21 meeting of the directorate of the Chilean Nitrate Producers' Association.

The Chilean Government very evidently believes that any increase of price at this time would do much to stimulate interest in synthetic processes.

Most of the costs of producing nitrates must be paid in pesos. These costs remain constant, despite the fact that the producers receive fewer pesos for their product, which is sold on a basis of pounds sterling.

Washington News

Chemical Engineers to Explore Federal Bureaus

Many Arrangements Already Made for December Meeting of Institute in Washington

Extensive preparations have been begun by the government agencies engaged in chemical activities for the entertainment and instruction of those who will attend the annual meeting in Washington Dec. 5 to 8 of the American Institute of Chemical Engineers. The first day is to be spent at the Bureau of Standards, the next at the various laboratories under the jurisdiction of the Department of Agriculture, and the third day at the laboratories in the Interior Department. The fourth day will be devoted to the business affairs of the organization, which will include the election of officers.

Full advantage is to be taken of this occasion to acquaint the visiting chemical engineers with the extent and the thoroughness with which the government is conducting its chemical research. The chemists in the government service expect to bring home to many of the visitors the very material amount of help which they are in a position to extend to industry. At the same time they hope to acquaint outside chemists with the character of governmental work to a sufficient extent that more co-operation will be forthcoming in the solution of the problems.

Committee Suggests Changes in Alcohol Regulations

The Commissioner of Internal Revenue is in receipt of numerous suggestions from his industrial alcohol advisory committee as to changes in regulation 60. No announcement is being made of changes that have been proposed, but there is reason to believe that the commissioner is in sympathy with most of them.

It is known that the commissioner is considering the extension to vehicular transportation many of the safeguards now accorded to transportation of industrial alcohol by rail. Under present conditions, it is the rule to hold trucks while investigations are being made as to the legitimate character of the transportation of alcohol. Very frequently trucks and their drivers are held out of service for an entire day while overzealous enforcement agents satisfy themselves that the alcohol is intended for legitimate purposes. Were the same policy applied to transport by rail, traffic of the country would be interfered with seriously.

Sampling and analysis of products containing alcohol apparently has proceeded without advantage having been taken of the long experience of the Bureau of Chemistry in administering the food and drugs act. It is believed that it has been suggested to the commissioner that a leaf be taken from the book of those engaged in the enforcement of that act.

While it is understood that the advisory committee has made a large number of changes in the draft of the regulations, it is believed that most of those have been made with the idea of simplifying and making understandable the very obtuse and legalistic language now employed. Many of the difficulties with which the legitimate alcohol trade has had to contend have resulted from the inability of enforcement agents to interpret the regulations correctly. Even if nothing else is accomplished other than making the regulations understandable, it is believed that the industry will be benefited greatly. There is every reason to believe, however, that Commissioner Blair is in full sympathy with the desire to rid industrial alcohol of any needless burden.

Invoices on Foreign Dyes Must Conform to Law

Officials of the Treasury Department have requested the State Department to instruct consular officers abroad to require invoices of dyes destined for shipment to this country and the immediate containers of such dyes to conform with new regulations drafted under the tariff act.

It is required that the invoices of dyes shall show a descriptive statement of the following particulars: Trade name of article and manufacturer's name, percentage of dye, exclusive of diluent contained in the article; Schultz or color index number if any; if none, the chemical classification of the dye or the other information required for each component dye in the mixture, together with the method of application of the mixture.

To Increase Argentine Duties

In a report to the Department of Commerce, Consul-General Robertson at Buenos Aires states that increases in Argentine import duties would be brought about by a bill which has just been passed by the Chamber of Deputies. By this bill all valuations in the tariff of values of 1906 are increased by 60 per cent, the 20 per cent increase of July 6, 1920, being repealed at the same time. Specific duties, with some exceptions, are increased by 25 per cent. Statistical duties are increased from 2 to 3 mille.

The effect of this project is to increase the ad valorem duties by one-third, and all but a few of the specific duties by one-fourth. The bill will need to have the approval of the Argentine Senate and of the President before it becomes a law.

Improve Import Statistics on Coal-Tar Products

As a means of further improving the monthly report on imports of coal-tar products which is prepared jointly by the Chemical Division of the Bureau of Foreign and Domestic Commerce and the Chemical Section of the Tariff Commission, products other than dyes will be listed as competitive or non-competitive, as colors are now stated, beginning with the report for July.

It also is planned to publish quarterly figures on imports of biological stains. The first report will appear in August, separate from the dye and coal-tar chemicals report, and will cover May, June and July. The second report probably will be delayed until January to include the last 5 months of the calendar year, after which the figures on stains will be issued every 3 months.

Competition in Argentine Paint Trade

The American consul at Rosario, in a report on manufacture of paints in the Argentine, states that there are more than forty paint factories represented in that country, and competition is sharp. The British have an advantage in the paint trade, since they have their own stores for distribution and many of the railways, public utilities and large industries are in their hands. Probably two-thirds of the paint factories doing business in Argentina are British, but included in the other one-third are some of the best-known American houses.

New Treasury Ruling on Imports From Norway

The Treasury Department has informed customs collectors of a change in regulations concerning the assessment of duties on imports from Norway in order to conform to the practice in that country. Assistant Secretary Moss in his notice to collectors states that the basis for the assessment of duties in Norway is the wholesale price in the country of origin, the price actually paid for the merchandise plus the cost of transportation, paid in Norwegian crowns, the conversion of the values to be made at the rate prevailing on the day of importation.

Algeria Importing Normal Amounts of Calcium Carbide

Consul E. A. Dow at Algiers reports that the consumption of calcium carbide in Algeria, which imports all of its needs for this product, is considerable, especially in outlying districts where electric current is not available. Imports in 1913 (the last full pre-war year) amounted to 4,821 metric tons, worth $167,524 at normal exchange. In 1919 but 1,659 metric tons, valued at $209,585 were received. By 1921 imports returned to normal, reaching 3,131 metric tons, worth $214,200, and in 1922, 4,025 metric tons, valued at $300,488, were imported.

Foundation Trial Ended After Eight Weeks of Testimony

Close Brings Loose Ends Together—Test Made of Cinchophen Patent—Final Arguments in October—Appeal to Higher Court Expected

THE TRIAL of the government's suit for the return of 4,800 patents seized and sold early in 1919 to the Chemical Foundation for the sum of $250,000 is ended. On the evening of July 23, following a period of 8 weeks during which testimony was being presented, the trial came to a dramatic close. The question of valuation of the disputed patents was taken to hinge largely on their workability. For that reason, Federal Judge Morris decreed that a laboratory test should be made to determine whether or not two of the patents concerning which there has been much dispute were actually workable if directions outlined were followed absolutely. Salvarsan and cinchophen were the two substances governed by the patents in question. After 26½ hours in the laboratories of Swarthmore College, working under the eye of court officers, Dr. Louis Freedman, a chemist at the Metz laboratories, with Dr. Moses L. Crossley and Dr. Elmer K. Bolton, succeeded in obtaining a certain amount of cincophen. Considerable dispute followed as to its quality. The court was said to attach great import to the experiment. With this testimony the trial closed. Final arguments will be heard in October. It is expected in most quarters that the case will go to the Supreme Court. It is understood that Colonel Anderson, who has been conducting the case for the government, believes it to be one of the most significant and important in recent years.

At the final session Judge Morris denied a motion by the government to strike from the bill of complaint the references to two assignments of patents to the Chemical Foundation by Thomas W. Miller, Alien Property Custodian, made in 1921. Assistant Attorney General Anderson explained that the purpose was to make the bill conform more nearly to the general testimony. Judge Morris' denial of the motion was on the ground that the original bill had been verified by Mr. Miller.

The trial has been filled with incidents of interest to the industry. The most important witnesses have been Frank L. Polk, acting Secretary of State when the sale was made; A. Mitchell Palmer, the first Alien Property Custodian; Francis P. Garvan, and Herman A. Metz. The first three explained why the sale was private instead of by public auction. One major reason given was that the latter method would have made an American monopoly possible. Herman Metz testified largely with regard to valuation, setting this higher than that which the witnesses of the defence, notably E. H. Volwiler of the Abbot Laboratories, Chicago, maintained they were worth as judged from their workability. The contention over the value of the Haber patents was built around declaration of great value by Col. Anderson, which was met by Dr. Charles L. Parsons and others. A most important ruling concerning the chemical engineering industries came in Judge Morris' decree that trade secrets should be held inviolate and that the disclosure of such secrets should not be sought even in camera.

The final arguments of the case will be heard in October. Up to date 1,100 exhibits in the case have been filed, mostly of documentary evidence. The corps of stenographers who have been working on the case have transcribed 5,700 pages of testimony. A most complete setting forth both of the government's position and of that taken by the Chemical Foundation has been given the court. Because of the many questions of law involved, revolving for the main part around the right of a court to review Presidential discretion, the case is regarded in many quarters as one of the most significant in years.

In the normal course final adjudication would require several years and in that time many of the patents involved would expire. For this and other reasons the government will probably ask the appellate courts to expedite its consideration.

Must Reveal Composition of Shellac Substitutes

The advertisement and sale of a shellac substitute without clearly indicating the ingredients used in the manufacture of such substitute are declared by the Federal Trade Commission to be an unfair method of competition. This decision was reached by the commission in its case against the Don-O-Lac Co., Inc., of Rochester, N. Y., and an order to cease and desist from such practice issued.

The commission found that the respondent marketed a product under the name of "American Shellac" which contained little or no genuine shellac gum. This, the commission's findings state, misled the purchasing public and was unfair to competitors who truthfully designate their products. The commission's order prohibits the Don-O-Lac Co. from using the word "American Shellac" or the word "shellac" alone or in combination with any word or words on any product not composed wholly of 100 per cent shellac gum, cut in alcohol, unless accompanied by word or words clearly setting forth the percentage of each ingredient of which such substitute is composed.

Ceramic Society to Visit Plants in Toledo and Detroit

As is well known, technical sessions are dispensed with at summer meetings of the American Ceramic Society, the entire time being devoted to plant inspection and the promotion of good fellowships.

This year the activities will center around Toledo and Detroit and the following itinerary has been arranged:

Wednesday, Aug. 8, at Toledo

8 a.m.—Hotel Secor, Toledo. Dr. H. W. Hess and A. S. Zopfi, committee in charge. Visits to glass plants and Buckeye Clay Pot Co.

7:25 p.m.—Leave for Detroit on Michigan Central train 306.

9 p.m.—Arrive Detroit. F. H. Riddle, Mrs. W. B. Stratton, H. F. Royal, H. S. McMillan, Joseph Hoehl, J. R. Kempt, committee in charge.

Thursday, Aug. 9, at Detroit

9 a.m.—Chartered bus to Ford Motor Co. (experimental continuous pour plate glass plant) and Champion Porcelain Co. (Dressler tunnel kiln operating at cone 18).

2 p.m.—Trips chosen by delegates: Porcelain Enameling & Mfg. Co., Detroit Stove Works; Wolverine Porcelain Enameling Co.; Pewabic Pottery Co.; Detroit Brick Plants.

7:30 p.m. — Boat ride; dancing on deck.

Friday, Aug. 10, at Flint

8:10 a.m.—Leave by special cars for Flint. T. G. McDougal, P. D. Helser and S. J. McDowell, committee in charge. A. C. Spark Plug Co. (complete production and assembling of plugs, novel tunnel kiln operating at high temperature); Buick Motor Co.

8 p.m.—Dinner with entertainment and dancing, Hotel Wolverine.

Saturday, Aug. 11, at Detroit

9 a.m.—Special bus to Detroit Star Grinding Wheel Co.; River Rouge plants of Ford Motor Co.; the Ford steel plants; Ford new plate glass plant.

Acetate of Lime Output Larger in May

The Department of Commerce announces the May production of acetate of lime and methanol based on reports received by the Bureau of the Census in co-operation with the National Wood Chemical Association.

The following table shows total comparative figures for the first 5 months of 1923, as reported by firms with a daily capacity of 4,500 cords (or prorated to that capacity in months where some reports were lacking) and the comparable monthly figures for 1922, taken from the *Survey of Current Business:*

	Production	
1923	Acetate of Lime, Thous. of Lb.	Methanol, Gal.
January	16,544	933,171
February	13,894	733,179
March	15,569	831,784
April	13,575	738,059
May	14,689	793,462

American Consumers Asked to Bid on Seized German Dyestuffs

French and Belgian Requirements Will Leave About 3,500 Tons for Export

REPRESENTATIVES of American consumers have offers to bid on 500,000 lb. of dyestuffs seized by the French and Belgians from German plants in the Ruhr, according to a cablegram to the Department of Commerce from Commercial Attaché C. L. Jones at Paris, dated July 13. The message gives the quantity seized as 6,500 tons, and stated that the inventory would require at least another week. The stocks are at Strasbourg.

Bids probably will not be received until the end of the month, the commercial attaché reported. The French and Belgians intend to keep amounts equivalent to their needs for the current calendar year and to sell for export the surplus of approximately 3,500 tons.

The Union des Productours et des Consommateurs des Matières Colorantes probably will conduct the sales, the message states, although it is undecided whether all sales shall be through one agency or whether sales of the French and Belgian shares shall be separate. The present feeling is that there is no danger the sales will upset the French market, the cablegram says, as the Union has previous experience handling reparations dyes and "demand from many countries makes good prices probable."

Situation in the Ruhr

The Department of Commerce also has received a detailed report of the observations of Commercial Attachés Jones, Paris and Herring, Berlin, who together made a 5-day tour of the Ruhr late in June. Regarding the chemical and dye situation, this report states:

"Production estimates are unobtainable, but the output is apparently less than 50 per cent of the normal, while plants in French and Belgian territory are practically closed down. In the British zone production is still reported normal, but only raw materials produced in this zone are obtainable and how long production can continue at its present rate is problematical. Manufacturers of chemicals would be glad to buy foreign coal, benzols and similar products on a c.i.f. factory basis, but are unwilling to take the risk of having shipments destined to them confiscated by the French or the Belgians.

"Stocks of chemicals and dystuffs in German hands in the French and Belgian zones are low. The recent French seizure of dyestuffs at Ludwigshafen included 862 tons of aniline and 1,597 tons of alizarine, vat dyes and indigo, as well as small amounts of chemicals. About two-thirds of the anilines which they found in the Badische Anilin und Soda Fabrik establishments at Ludwigshafen were left there. At the nitrate plant at Oppau the French seized the stocks of ammonium nitrate and have carried off part of it. They have not been able to get the caked nitrate out of the silos as rapidly as they would desire even with their limited power of carrying it away.

Chemical and Dye Stocks Reduced

"On the whole chemical and dye stocks are not likely to be as important a factor in international trade when the deadlock ends as might be supposed. Plants outside British territory are disinclined to produce for stock, which later may be commandeered, and the normal demand from the consuming industries of unoccupied Germany will tend to offset abnormal stocks in the British zone. Furthermore, stocks belonging to plants in the British zone were previously established in unoccupied Germany and are now being drawn upon so that net stocks at the end of the crisis will be proportionately reduced.

"The chemical and dyestuffs seized have been taken under the alleged authority of the reparations agreement. American buyers report that the French announced as their intention the seizing of the amounts of chemicals and dyestuffs due from the Badische Anilin and the Hochst plants at Ludwigshafen and Oppau, plus such amounts as should have been delivered by Berlin and Frankfurt plants, plus enough to cover the cost of the seizures."

Tariff Hearing on Nitrite of Soda Will Be Held Sept. 10

The Tariff Commission has ordered a public hearing Sept. 10 on the application of the American Nitrogen Products Co., Seattle, Wash., for an increase in the duty on sodium nitrite which was filed several months ago under the terms of the flexible tariff. Investigation of the application was ordered March 19. The field work, here and abroad, has been concluded.

An increase of 50 per cent in the 3 cents per pound duty fixed by the 1922 tariff act is sought by the applicant. The duty under the 1913 tariff act was only one-half cent per pound, but sodium nitrite was one of the chemicals included in the so-called embargo under the Dye and Chemical Control Board created during the war and which functioned until last September, when the new tariff act became effective.

Owing to the rapid development of the domestic dye industry, command of the nitrite market is of increasing importance, the commodity being used in production of coal-tar dyes, as well as having other uses.

Trade Notes

Max V. Kohnstamm, vice-president of H. Kohnstamm & Co., color manufacturers, died at his home in Chicago, Ill., on Sunday, July 22. Mr. Kohnstamm had been in charge of the Chicago and Western business of the company for a number of years.

A petition in bankruptcy has been issued against the Standard Color Works, Inc., of 35 Nassau St., New York. The petition alleges the liabilities are about $75,000 and that the corporation has transferred the greater part of its assets to certain stockholders and others.

Philip L. Reed has resigned as treasurer of the Eastern Leather Co. and has joined Armour & Co. at Chicago in the capacity of assistant treasurer.

Construction of a sugar refinery, with an initial cost of $3,600,000, by the Norfolk Sugar Refining Co., Inc., will start at Norfolk, Va., in a few weeks.

No goods requiring manual labor in handling will be allowed to enter or leave Chile packed in sacks or bags weighing over 80 kilos (176 lb. avoirdupois), by a law effective Aug. 28, 1923. Violation of this law is punishable by a fine of 20 pesos for each infringement, but goods already packed on the date the law becomes effective are exempt.

Horns, bones and dried blood of cattle will hereafter upon exportation from Salvador pay a duty of 5 centavos gold per gross kilo, according to a decree published in the *Diario Oficial* of Salvador on June 6 and effective June 18. They were formerly exported free of duty. The surtax of 2 centavos gold on each 100 kilos of merchandise and 1 peso gold per set of custom house permits will continue to be collected.

The Dupont Fibre Silk Co. has increased its capital stock from $12,500,000 to $15,000,000.

Exports of camphor from Hongkong, China, amounted to 1,976 piculs in 1922. Of this amount 569 piculs was shipped to the United States.

Shipments of linseed from the Argentine from Jan. 1. to July 23 amounted to 36,840,000 bu. This compares with 20,780,000 bu. for the corresponding period of the preceding year.

Gas Association Officers Are Nominated

The nominating committee of the American Gas Association has reported, in accordance with the constitution, its nominations for officers for the next fiscal year. The committee recommends for election: For president, J. B. Klumpp; for vice-president, C. O. G. Miller; and for treasurer, H. M. Brundage. As nomination is always substantially equivalent to election, it is generally assumed that these will be the new officers of the A.G.C.

Mining Engineers' Convention To Be Full of Activity and Pleasure

Canadian Hosts Planning Elaborately for Entertaining Guests—Many Plants and Industries on Lists to Be Visited

ELABORATE preparations are being made in Canada to entertain the delegates to the 128th meeting of the American Institute of Mining and Metallurgical Engineers, which will be held from Aug. 20 to 31. The technical sessions will be held in Montreal on Aug. 30-31, and the program will include a banquet on the evening of Aug. 30, which will be attended by leading engineers of the United States and Canada.

With the co-operation of the Ministers of Mines of Ontario and Quebec and of the members of the Canadian and American Institutes of Mining and Metallurgical Engineers, the vast mineral wealth of this region will be placed on exhibition. The program includes visits to leading mines and technical sessions at which prominent engineers from many sections of the country will describe the developing problems of mining and metallurgy.

Petroleum and gas will be among the principal general subjects of the technical sessions. The geology of Santa Elena oil fields, Ecuador, will be discussed by Joseph H. Sinclair of New York and Prof. Charles P. Berkey of Columbia University. Other papers will be presented by A. F. Meston of New York and Oliver U. Bradley of Muskogee, Okla.

At the iron and steel sessions, papers will be presented by H. H. Lester of the Watertown Arsenal, C. Baldwin Sawyer, Cleveland, O.; Prof. Richard S. McCaffrey and Prof. Joseph F. Oesterle, University of Wisconsin; C. E. Macduigg, Alexander L. Feild and Ancel St. John, New York; H. A. Schwartz, H. R. Payne and A. F. Gordon, Cleveland, and L. N. Brown, Detroit.

The geology session includes papers by C. E. Wuensch of Chicago, Sherwin F. Kelly, Lawrence, Kan., and G. W. Bain, East Orange, N. J.

"Helium, a National Asset" will be discussed by Richard B. Moore, late chief chemist of the U. S. Bureau of Mines, Washington, at the session on mining, other speakers at which will be A. B. Calhoun, Burma, India; Graham Bright, East Pittsburgh, Pa., and S. P. Holt, Bingham Canyon, Utah.

Another session will be devoted to milling and metallurgy, the speakers being Arthur Crowfoot, Morenci, Ariz.; George C. Griswold, New York; and H. E. T. Haultain, University of Toronto. Motion pictures of mining operations will be displayed by Mr. Haultain and F. C. Dyer of the University of Toronto.

Sales of Barytes More Than Doubled in 1922

The sales of barytes mined in the United States in 1922 amounted to 155,000 short tons, more than twice as much as in 1921 and about 75 per cent of the average yearly sales for 1916 to 1920. The total value of the domestic barytes sold in 1922 was $1,123,950, an average of $7.25 a ton.

Barytes is a heavy white mineral that enters extensively into modern paint manufacture. An inferior grade of pigments is made from it by grinding it so fine that its powder can be floated on water. A better grade of pigment is made by chemical treatment, and a superior grade by making chemically a mixed zinc and barium pigment.

Missouri continued to lead in the production of barytes in 1922, but Georgia was a close second. More than three-fourths of the total domestic output came from these two states.

The imports of crude barytes in 1922 amounted to 23,239 short tons, valued at $104,680 at the foreign ports of shipment. This is about twice as much as the imports in 1921, but a little less than those in 1920. The barium products industries in the United States consumed 167,842 short tons of ore during the year. From this ore they made 46,176 short tons of ground barytes, 83,360 tons of lithopone and 13,900 tons of barium chemicals, having a total value of $11,397,832. This is about one and one-half times the quantity of barium products manufactured and sold in 1921, but not so much as was made in 1920. The average annual value of lithopone has decreased from $139.69 a ton for 1920 and $121.45 for 1921 to $110.53 for 1922. Most of the lithopone produced in 1922 was made in Pennsylvania, Delaware and New Jersey, in the vicinity of Philadelphia, where there are eight operating lithopone plants.

More than 80 per cent of the ground barytes was produced in Missouri. Barium chemicals were made in eight plants, of which New Jersey, New York, Pennsylvania, West Virginia, Tennessee and California have one each and Illinois two. More than half the chemicals made consisted of barium sulphate (blanc fixe), but large quantities of carbonate and chloride were also made.

The imports of barium products, including ground witherite or natural barium carbonate, in 1922 amounted to 27,300 short tons, valued at $1,573,052. This is more than twice the quantity imported in 1921. More ground barytes was imported in 1922 than in any year since 1913, and over four and one-half times as much as was imported in 1921. The imports of lithopone in 1922 amounted to 21,525,824 lb., which is more than twice the quantity imported in 1921 and in fact more than the total quantity imported in the 6 years 1916 to 1921; 3,231,722 lb. of lithopone was exported in 1922.

Du Pont Interests Purchase Part of Old Hickory

Manufacture of Fiber Silk on Large Scale Planned Where Munitions Were Made During War

The DuPont Fibersilk Co., a subsidiary of E. I. du Pont de Nemours & Co., has just closed a deal with the Nashville Industrial Corporation, industrializers of the Old Hickory powder plant at Jacksonville, Tenn., for a tract of 500 acres upon which to erect a fiber silk factory. The deal includes housing facilities for about 1,500 employees, and a factory site on which to build permanent factory buildings. The area purchased by the du Ponts constitutes a tenth part of the Old Hickory powder plant.

The purchasers selected this site after carefully looking over several other sites, both in the North and South. Two factors which contributed to their choice of this site were said to be the water supply and the availability of high-class labor.

The process for making fiber silk, as explained by Maurice du Pont Lee, is dependent on a bountiful supply of satisfactory water. The Cumberland River, which is adjacent to this property, will furnish this. The wood pulp which is the basis of the fiber silk will, at the outset, come from the mills of Maine. In this way the usual situation of bringing a raw material from the South to become a finished product in New England is reversed. Other ingredients are caustic soda, carbon bisulphide and sulphuric acid, which are mixed with the wood pulp, and the solution is spun into threads, which are solidified in an acid bath, washed in warm water, dried, rolled into skeins, bleached and packed. The finished product is a broad silk suitable for weaving into materials for ladies' evening dresses, upholstery, tapestry, carpets, braids, laces, sweaters, knitted goods, neckties, hosiery and ribbons and other fabrics using a material very similar to worm silk.

Chilean Nitrate Association Extended Another Year

The Association of Nitrate Producers, by the practically unanimous vote of its members, has resolved to extend the legal existence of the association until June 30, 1924.

Meanwhile, the situation of the industry as a whole is improving rapidly, in view of the enormous sales recently effected. The total of sales and deliveries of nitrate for the next season amounts to no less than 7,199,896 metric quintals, while surplus stocks have rapidly been absorbed. For the month of May, the production of 65 oficinas amounted to 1,509,600 metric quintals, as compared with 749,165 metric quintals during May, 1922, when only thirty-two oficinas were working.

The nitrate year 1922-23 has produced 5,271,706 metric quintals more than 1921-22.

Rhineland Commission Enacts Regulations Governing Customs Enforcement

Defines Procedure to Be Followed in Import and Export Trade With the Occupied Territory

THE Department of State is informed by the American Embassy at Paris that the Inter-Allied Rhineland High Commission recently enacted the following regulations in connection with the customs régime in the occupied territory of Germany:

I. PRODUCTS COMING FROM FOREIGN COUNTRIES AND ENTERING THE OCCUPIED TERRITORY BY THE WESTERN FRONTIERS AND THE RHINE.

A. Licenses. These products cannot as a rule be imported except under an import license which is previously delivered by the Bad-Ems Service (territory heretofore occupied), or by the Essen Service (Ruhr and the Dusseldorf Bridgehead), upon the application of the importer; an administration tax of 1/1,000 (Gebuhr) ad valorem, is charged by this service at the time of the delivery of the license. An import license is not required for a certain number of articles, a complete list of which is published and put on sale by the Customs Executive Committee. This list has been drawn up in accordance with the German regulations, and comprises a large number of food products and raw materials.

B. Customs Duties. The customs duties applicable to merchandise entering occupied territory under conditions as defined above are specific duties according to the inter-allied customs tariff which has been in force since March 25, 1923. This inter-allied tariff reproduces the duties in force according to German legislation; but does not, however, take in certain modifications enacted by Germany after Oct. 1, 1922, which placed under great disadvantage certain products usually coming from France and the allied countries. The duties in the inter-allied tariff are expressed in terms of gold marks. In order to convert them into paper marks at the time of payment of duties they are multiplied by a coefficient fixed periodically and determined in such a way as to take into account the depreciation of the mark. The payment of the duties is effected in the frontier offices or offices in the interior.

II. PRODUCTS IMPORTED INTO OCCUPIED TERRITORY FROM FOREIGN COUNTRIES ACROSS UNOCCUPIED GERMAN TERRITORY.

A. Licenses. The necessary licenses to cover these importations are delivered by the Bad-Ems and Essen Services, in accordance with the general rules governing these matters.

B. Duties. No tax is required to be paid on entering the occupied territory if proof is produced that the merchandise is of foreign origin and that customs duties have been paid in the custom houses of unoccupied Germany.

III. PRODUCTS COMING FROM UNOCCUPIED GERMANY AND ENTERING OCCUPIED TERRITORY OVER ITS EASTERN BORDER.

A. Derogations. The entry of these products is conditioned on the granting of an entry derogation, which is delivered upon the application of the importer in one of the seven offices with territorial jurisdiction which have been opened in the occupied territory (Essen, Crefeld, Cologne, Coblentz, Treves, Mayence, Ludwigshafen).

However, such products as are expressly exempt from the derogation duties defined below enter without charge.

B. Derogation Duties. The issuance of the entry derogation gives occasion for the payment of special derogation dues which are fixed at 25 per cent of the specific duties assessed by the inter-allied tariff of customs duties. Thus products which are on the free list in this tariff may enter the occupied territory duty free.

IV. PRODUCTS COMING FROM THE OUTSIDE AND TRAVERSING OCCUPIED TERRITORY, CONSIGNED TO UNOCCUPIED GERMANY.

This merchandise is subject to the same duties as that consigned to the occupied territory—that is, to the tariff duties of the inter-allied customs. Payment is effected in the first office of the occupied territory having the power to receive it. The free circulation of this merchandise and its exportation, exempt from duty, to unoccupied territory are then under customs supervision.

The following is the regulation covering the exportation of merchandise from occupied territory:

I. PRODUCTS EXPORTED FROM OCCUPIED TERRITORY TO FOREIGN COUNTRIES OVER THE WESTERN BORDERS AND THE RHINE.

A. License. These exportations must as a rule be covered by an exportation license delivered by the Bad-Ems Service (territory heretofore occupied) and by Essen (Ruhr, Dusseldorf Bridgehead), upon the application of the exporter.

No license is required for products enumerated in the list "of products exempt from exportation license."

A new edition of this list, canceling the preceding one, has been put into effect the first of May. It covers from now on only merchandise which is not subject to the taxes defined below; all the products which are, on the contrary, subject to the taxes can no longer be exported, without a license, even if the German regulations exempt them from this formality.

The issuance of exportation licenses is subject to the following conditions: to the invoicing in estimated foreign exchange of merchandise for which license is asked; to certain precautions in determining this price in order to make sure of its sincerity (the fixing of a minimum price); to the pledge of depositing to the account of the Committee Director of the Customs, in one of the banks designated for this purpose, a certain percentage of foreign exchange to be thereafter reimbursed in paper marks; to the payment of administration dues (Gebühren) amounting to 3-0/00; to the payment of the export tax (Ausführabgabe) defined below.

B. Expert Tax. An inter-allied tariff of export taxes, establishing ad valorem taxes which run, according to the nature of the merchandise, from 0 to 10 per cent, went into effect the first of May. It supersedes the uniform 10 per cent tax and has been established according to the German reckoners which have been applied in the last two years.

II. PRODUCTS EXPORTED FROM OCCUPIED TERRITORY TOWARD FOREIGN COUNTRIES, LEAVING BY THE EASTERN LIMIT AND TRANSPORTED ACROSS UNOCCUPIED GERMANY.

The rules defined in the preceding paragraph are applicable entirely to this traffic. An exportation license and the payment of exportation taxes are therefore necessary unless it is a question of merchandise stipulated in the list of products that can be freely exported. In this latter case, and in order to guarantee the reality of the traffic across unoccupied Germany, a guarantee amounting to 10 per cent must be deposited. This will be reimbursed upon producing receipt showing that payment has been made of entry duties in the foreign country to which the goods may be consigned.

III. PRODUCTS EXPORTED FROM OCCUPIED TERRITORY BY THE EASTERN LIMIT AND CONSIGNED TO UNOCCUPIED GERMANY.

A. Derogation. The exportation of these products is conditioned on the granting of an export derogation which is delivered by the derogation offices (a list of which is given above), upon the application of the exporter.

B. Derogation Dues. The duties collected for the granting of export derogations are computed since the first of May in accordance with the inter-allied tariff of export duties, and payment is made in the derogation offices.

IV. PRODUCTS COMING FROM UNOCCUPIED GERMANY, TRANSPORTED ACROSS OCCUPIED TERRITORY, THE DESTINATION OF WHICH IS A COUNTRY FOREIGN TO GERMANY.

These products are not subject to any taxes, either on entering or leaving the occupied territory, on the condition that an exportation license, delivered by a competent organization of unoccupied Germany and showing the deposit of the tax in a finance office of unoccupied Germany, is presented to the authorities on entering and leaving the occupied territory.

Facts and Figures That Influence Trade in Chemical Products

Market Conditions

Current Prices Imports and Exports The Trend of Business

Imported Chemicals Are Steadier With Cable Offerings More Reserved

Better Inquiry Reported but Buying Orders Are Limited—Fewer Price Changes Noted

ALTHOUGH the weighted index declined during the week, the drop was attributed more to the easier position of some allied materials than to chemicals, strictly speaking. In many cases chemicals have been going downwards in price for a long time and the opinion is heard that different chemicals are about on bottom, especially as consumers are expected to begin placing buying orders more freely in the coming month.

Imported chemicals have been a disturbing element on prices and during the past week they were featured by a lessening of selling pressure, especially at primary points and cables generally quoted shipments at levels about the parity of spot quotations. This had a steadying effect on the market generally but most directly was felt in cases of materials which are in competition with foreign made goods. Chemicals originating in Germany were prominent in the cables as they have been weak in price and any indication of their becoming firmer is of market significance.

Permanganate of potash was quoted 3c. per lb. above the spot price, for later deliveries. Caustic potash for shipment was higher than a week ago. Prussiates, which have been unusually weak, were noticeably firmer and selling pressure was lessened by the cleaning up of low priced spot lots. On the other hand some chemicals of domestic make, practically free from foreign competition, were lower in price. This was true of bichromate of soda, which is under pressure. Tin oxide also was lowered with lower producing costs as the reason. Arsenic and calcium arsenate have lost all appearances of stability and private terms enter into sales, with arsenic difficult to sell at any price.

Advance import and export figures for June received during the week indicate a sharp decline in chemical imports for that month and also show material declines in the exports of many chemicals. Export demand in the present market is not prominent. The position of some of the fertilizer chemicals has been favored by recent trading. A few weeks ago the fertilizer trade placed orders covering most of their potash requirements. They now have contracted for large amounts of nitrate of soda and the latter material is steadier in price. Interest in other fertilizer chemicals likewise has improved and the outlook is regarded favorably.

Members of the trade are following tariff developments closely and the principal development of the week was found in the announcement that a public hearing would be held on Sept. 10, to consider petition for higher duty on nitrite of soda.

Yellow Prussiate of Potash Firmer — Caustic Potash Higher for Shipment — Permanganate of Potash Stronger — Bichromate of Soda Declines—Tin Oxide Down 2c.— Calcium Arsenate Sells at 11½c. — Cyanide of Soda Easy — Titanium Potassium Oxalate Lower.

Acids

Acetic Acid—This material is featured by a steadiness in price which may be attributed to a fairly steady consuming call for stocks and to the steady position of raw materials. Production figures for May show acetate of lime output was larger than in April but this caused no accumulation of stocks. Quotations for the acid are repeated at \$3.38@\$3.63 per 100 lb. for 28 per cent; \$6.78@\$7.13 per 100 lb. for 56 per cent. Glacial acetic varies in price according to make and seller with \$12@\$12.78 per 100 lb. asked.

Formic Acid—There has been no improvement in the situation as far as domestic acid is concerned. Production is practically at a standstill and imported acid governs the market. Prices quoted for imported range from 12c. to 14c. per lb. Imported also seems in plentiful supply and shipment prices have been in line with values prevailing on spot.

Citric Acid—Domestic acid is reported to be moving steadily. Most of production has been sold ahead and this restricts spot trading. Prices have held under the level asked for imported goods and this still is the case as quotations for domestic are 49@50c. per lb., while imported is held at 51@52c. per lb. Demand has been quiet and the quoted prices for imported have not been firm, as sales were reported under the inside figure.

Hydrofluoric Acid—A quiet period is reported. Consuming trades are seasonably dull and this condition accounts for the light trading in acid. Prices are holding steady with producing costs very firm. Fluorspar, acid lump, is firm at \$42 per ton. Quotations for the acid are 6@7c. per lb. for 30 per cent; 10@11c. per lb. for 48 per cent; 11@12c. per lb. for 52 per cent; and 13@14c. per lb. for 60 per cent.

Muriatic Acid — While spot trading has fallen off with the summer months, there is a good movement on old orders and present consumption is said to be of satisfactory volume. The quiet condition of the market has enabled producers to store up stocks and with offerings free the tone of values is less strong, although no change in quotations has been made. Asking prices are 90c.@\$1 per 100 lb. for 18 deg., \$1@\$1.10 per 100 lb. for 20 deg., and \$1.75@\$2 per 100 lb. for 22 deg.

Oxalic Acid — A dull week was reported for this material. Small lots are moving in a routine way. Prices are on a relatively low basis, with domestic and foreign acid very close together on a price basis. Producers quote domestic at 12½c. per lb. at works. Imported is quoted at 12½c. per lb. on spot, with some range from that level according to seller.

Tartaric Acid — Despite the lower price level at which imported has been held, there has been no change in the position of producers of domestic grades. A good movement of domestic acid is reported and spot trading also has been of fair proportions. Prices remain at 37½c. per lb. Imported material has been pressed for sale and prices heard range from 34½c. to 35½c. per lb.

Potashes

Bichromate of Potash—The desire of sellers to interest buyers has kept prices easy and offerings are now available at 10½c. per lb. Both export and home buying has been dull for quite a period and this is said to have increased stocks at works and caused selling pressure to lessen holdings.

Chlorate of Potash—Large amounts stored in New Jersey were in danger last week through fire breaking out in the building but the flames were kept from reaching the chlorate. The spot market is disturbed by offerings of imported variously held and on which different prices are heard with quality frequently accounting for the difference in sellers' views. Quotations are 6½c. to 7½c. per lb. Domestic chlorate is steady at 8½@9c. per lb. at works.

Caustic Potash—A firmer feeling was noted among sellers of imported caustic potash. Cables quoted shipments firm at 7¼c. per lb. and this had a steadying effect on the market generally. It was possible to pick up spot goods at 7¼c. per lb. but many held out for higher prices and temporarily at least values were firmer. Domestic grades are held at an inside figure of 9c. per lb., at works.

Permanganate of Potash—Cables showed futures to be in a strong position. Some cables quoted shipments on a basis of 20c. per lb. and in every instance it was stated that spot goods could not be replaced at the prices they were offered at. The spot market also was steadier and there were no free offerings under 17c. per lb. It is possible that this price might be shaded but the trend was to stiffen prices and there was no doubt that the market had worked into a firmer position.

Prussiate of Potash—Red prussiate has received some inquiry but it is not moving regularly and there are stocks which holders are anxious to dispose of. The quotation of sellers is 64@66c. per lb., but the inside price is not strong and could be shaded materially. Yellow prussiate is firmer. Low priced spot offerings have been pretty well absorbed and the inside price was given at 33c. per lb., with many refusing to sell under 34c. per lb. On shipments, however, 30c. per lb. could have been done.

Sodas

Acetate of Soda—Lack of buying interest is pronounced and sellers say it is very hard to move goods. Prices are easy, with buyers able to hold off for concessions. First hands quote at 5½@6c. per lb. but business has been done under the 5½c. level and 5c. per lb. is said to be the actual trading basis.

Bichromate of Soda—Only moderate buying is reported and the tone of the market remains easy. First hands are shading and prices at 7⅝c. per lb., works, and later at 7⅜c. were heard. One producer is credited with leading the way in cutting quotations with others promptly following. Some resale material also is competing for attention.

Caustic Soda—Export figures show that for the first half of the year shipments of caustic were less than two-thirds what they were for the corresponding period of 1922. This decline in export trade is still noted and present quotations are said to be too high to compete in some foreign markets. The f.a.s. quotation of local sellers is not firm as they generally quote 3.30c. per lb. for standard brands and will take business at lower price levels. The domestic trade in caustic presents nothing new but is going along in a very satisfactory way. For carlots at works, sellers quote 3.16½c. per lb. in drums. Ground caustic is offered at 3.60c. per lb. in drums and 3.85c. per lb. in bbl., at works, and the same prices apply to flake.

Cyanide of Soda—Buyers were not operating to any extent and prices were easy. One lot of 30 tons on spot was offered at 19c. per lb. Other sellers offer at 20c. per lb. and still others at prices ranging up to 22½c. per lb. Hence prices are almost entirely a matter of seller with difference in grade also a market factor.

"Chem. & Met." Weighted Index of Chemical Prices

Base = for 1913-14

This week	167.02
Last week	168.36
July, 1918	277.00
July, 1919	231.00
July, 1920	274.00
July, 1921	148.00
July, 1922	156.00

The decline of 134 points in the index number was brought about by continued weakness in crude cottonseed and raw linseed oils.

Nitrate of Soda—More interest has been taken in this material and reports that large consumers had placed joint orders for 25,000 tons have been current. These purchases were for regular periodic delivery over the season. Most buying at present is for nearby positions and distant deliveries are not much in favor. Quotations for spot nitrate is steady at $2.45 per 100 lb. Refined nitrate is quoted at 4@4½c. per lb. for granulated and 5¼@5½c. per lb. for powdered.

Nitrite of Soda—A tariff hearing has been set for Sept. 10. An increase of 50 per cent is sought and investigations have been completed by the tariff commission. Imported nitrite has been prominent for some time but buyers have not been very active recently and neither domestic nor foreign grades are selling freely. Prices are easy with imported held at 7@7½c. per lb. and domestic unchanged at 7¼c. per lb., f.o.b. works.

Prussiate of Soda—Small lots of prussiate sold at 13½c. per lb. and in many quarters there was a tendency to hold that as an inside figure. There were sellers, however, who were open to bids and 13c. per lb. is regarded as a price at which considerable goods could be secured. Domestic makers quote at 15½c. per lb. but this is a nominal quotation and in many cases the prices of importers are being met.

Miscellaneous Chemicals

Arsenic—Official figures, as given elsewhere in this issue, show that imports of arsenic were larger in June than in any preceding month of this year. It is evident that between larger imports and increased home production, the total supply was large enough to fill all buying orders. At present the market is merely of interest to those who wish to see how low prices will go. There is no real buying and most factors have given up hope of any last minute demand. A lot of Japanese arsenic is reported to have sold on spot at 8½c. per lb. and other sales were reported at 9c. per lb. On shipments over the balance of the year, domestic grades are offered at 10c. per lb. and imported vary from 8c. to 9½c. per lb.

Barium Chloride—Interest was said to be good and buyers were bidding for stocks but were holding off placing orders to see if sellers would come down to meet their bid prices which generally were around $75 per ton, whereas sellers were quoting $80@$83 per ton. Barium carbonate was quoted at $65@$67 per ton for domestic. Imported was in light supply and shipments are not of interest because prices are $70@$75 per ton, which makes the imported higher in price than domestic.

Calcium Arsenate—One car sold at 11½c. per lb. and this indicates the uncertain position of the market. Asking prices range up to 15c. per lb. and trading is a matter of private terms. Demand is not active and rumors of weevil damage in the south have not stirred up demand for arsenate. Stocks are said to be large and many holders will probably be forced to carry over considerable quantities.

Magnesia Carbonate—Scattered inquiry was noted for this material. Moderate sized lots changed hands with domestic grades offered at 7½c. per lb., f.o.b. works, and 8@8½c. per lb. on spot. Stocks on spot are said to be light and this made the quotation more or less nominal, although prompt from works is readily obtainable. Imported grades show some range in price according to seller, with 8@8½c. per lb. generally asked.

Tin Oxide—Recent declines in tin and lessened demand for the oxide has eased the market for the latter and prices were lowered 2c. per lb. last week. Current price for the oxide is 45c. per lb.

Titanium Potassium Oxalate—A manufacturer in the middle west has announced that he is now producing this chemical and offers high grade material testing above 24 per cent titanium oxide at 27c. per lb., f.o.b. producing plant. In explaining the reduction in price from 30c. per lb. the manufacturer states that due to increased output and recent quiet demand he has considerable on hand. Also that he has raw materials purchased at a price below present levels which enables him to produce the oxalate at the reduced price level. Most sellers in the local market are asking 30c. per lb.

Alcohol

A steady undertone featured the market for alcohol, but no price revisions were made by first hands. During the week several shipments of denatured alcohol came through from Porto Rico. The quotations for the denatured held on the basis of 38c. per gal. for the special No. 1, in drums, carload lots. U.S.P. ethyl spirits closed nominally at $4.75@$4.80 per gal., in bbl., the price varying according to quantity. Methanol was maintained at $1.18 per gal. on the 95 per cent grade, and at $1.20 per gal. on the 97 per cent material. Methylacetone was raised by first-hands to the basis of $1.15 per gal., tank cars.

Coal-Tar Products

Unsettled Market for Benzene—Cresylic Acid More Plentiful—Phenol on Spot Easy—Salicylates Barely Steady

WHILE no open price changes were reported in benzene, the market presented a rather unsettled appearance and business went through at concessions. Stocks have accumulated in some directions. An encouraging feature was the news that production has fallen off as a result of the less active state of the market for coke, and traders were not anxious to meet the views of buyers on forward material. Export inquiry was moderate only. Prices named for cresylic acid on spot covered a wide range, with dark material pressing for sale. The offerings of cresylic have increased, while demand met with a slight setback. In phenol the situation continued to favor buyers and further weakness was in evidence, especially in spot material. Offerings of refined naphthalene were around at easier prices. The market for crude naphthalene underwent little if any change, foreign markets holding fairly steady on the better grades. Pyridine was in demand and with foreign producers well sold up, prices ruled firm all week. Salicylates were barely steady on keen competition for the few orders that actually came out, but producers announced no price changes. Solvent naphtha was firm on moderate offerings. Xylene, pure, was in better supply and there were sellers on spot around 70c. per gal.

Alpha-Naphthylamine—The market was unsettled in some quarters and settling prices ranged from 34@35c. per lb. On contract the inside figure could have been shaded.

Aniline Oil—Producers continued to quote on the basis of 16c. per lb., carload lots, but small lots could have been picked up at this figure in more than one direction. Demand was moderate only.

Benzaldehyde—Traders look for no change in the situation until production will commence some time this month. In the meantime prices are likely to hold on the basis of 75c. per lb. for the technical grade. The U.S.P. grade held at $1.50 per lb., with the f.f.c. at $1.75 per lb.

Benzene—Demand was not active and with stocks fairly large selling pressure was reported in several quarters. "Asking" prices underwent no change, but on a bid buyers were able to pick up material at concessions. The motor fuel situation did not improve, and this tends to depress the market for the coal-tar product. Export inquiry was around, but the ideas of buyers were considerably under the market. On the 90 per cent material the nominal quotation stood at 25c. per gal., in tanks, f.o.b. works, with the pure at 27c. per gal.

Cresylic Acid—Leading producers reported a satisfactory volume of business, and the contract price held around the 75c. basis on the 97 per cent grade. Outside interests were more eager sellers of spot material and prices heard covered a wide range. Smaller domestic producers were sellers around 90c. on immediate shipment goods. Material produced from imported acid was offered at prices ranging all the way from 90c.@$1 per gal., according to color, etc.

Naphthalene—The market was easy in tone, but prices underwent little change. Most traders continued to quote 7c. on flake, immediate delivery. Chips were offered down to 4⅝c. per lb., carload basis. Crude to import held at 2@2¼c. per lb., according to grade. Advices from Manchester report the market on crude as barely steady at £7@£12 per ton, according to grade, f.o.b. works.

Phenol—Spot material sold in a small way down to 31c. per lb. Several producers refused to shade 34c., while others held out for 35c. per lb. The spot market was extremely unsettled and not much business went through. On contract the leading producer held out for 28c. per lb. It was reported that on distant deliveries new producers stood ready to consider bids at concessions from the 28c. basis.

Salicylic Acid—The asking price held at 40c. per lb. on the U.S.P. grade. Not much buying interest was apparent and prices in some quarters were under pressure.

Xylene—Offerings on spot increased and second hands quote the market on the pure as nominal at 70@75c. per gal. Producers offered the pure on contract at 65c. per gal.

Procter & Gamble Guarantee Steady Employment

Beginning Aug. 1, the thousands of employees of the Procter & Gamble plants and offices, located in thirty cities in the United States and Canada, will be guaranteed steady employment, Colonel William Cooper Procter, president of the company, announces.

This innovation is an extension of the profit-sharing plan which was made the policy of the company many years ago. Under the new plan an employee is guaranteed full time for not less than 48 weeks in the year, regardless of seasonal depression in industry.

French Seize German Chemical Plant

According to advices received last week, the French have taken possession of the Bochumer Verein Chemical Works at Bochum. The report further states that all work at the plant has been suspended.

Polish Glass Works Active

Eighty-one glass works are now active in Poland. Fifty-two of them manufacture bottles, seventeen window glass, twelve crystal glass. Forty-six glass works, forming the union, give work to 12,000 persons and produce 10,210 tons of glass per month. Local requirements are met by 60 per cent of the glass industry's production, the remaining 40 per cent being exported to Rumania and Hungary. The only glass imported by Poland is for mirrors and watches and for optical and technical purposes.

Potash Production in 1922

The Interior Department announces that returns received by the Geological Survey from the producers of potash in the United States indicate that the output in 1923 amounted to 25,176 short tons of crude potash salts containing 11,714 short tons of actual potash (K_2O). The sales amounted to 22,028 short tons of crude potash containing 11,313 tons of K_2O, valued at $463,512. About 30,000 short tons of crude potash were held by the producers Dec. 31, 1922.

Latest Quotations on Industrial Stocks

	Last Week	This Week
Air Reduction	60½	64
Allied Chem. & Dye	66¼	66
Allied Chem. & Dye pfd	108½	108
Am. Ag. Chem.	13½	*14
Am. Ag. Chem. pfd	35	34
American Cotton Oil	4⅜	6⅞
American Cotton Oil pfd	14¼	17½
Am. Drug Synd.	4⅞	5
Am. Linseed Co.	20¼	21
Am. Linseed pfd	40	42
Am. Smelting & Refining Co.	57¾	56⅛
Am. Smelting & Refining pfd.	96	96⅛
Archer-Daniels Mid. Co., w.i.	30	28
Archer-Daniels Mid. Co. pfd.	96	94
Atlas Powder (new)	53⅜	52
Casein Co. of Am.	*60	*60
Certain-Teed Products	23	26
Commercial Solvents "A"	33	34
Corn Products	120½	121
Corn Products pfd.	119	120
Davison Chem.	30⅞	31
Dow Chem. Co.	*45	*42
Pu Pont de Nemours	118	119½
Du Pont de Nemours db.	83⅞	83
Freeport-Texas Sulphur	11¾	11⅛
Glidden Co.	8	8
Grasselli Chem.	*130	*132
Grasselli Chem. pfd.	*105	*105
Hercules Powder	105	*105
Hercules Powder pfd.	104	*104
Heyden Chem.	1⅞	1¼
Int'l Ag. Chem. Co.	2½	3
Int'l Ag. Chem. pfd.	7½	8
Int'l Nickel	12½	13
Int'l Nickel pfd.	80	*80
Int'l Salt	77	*78
Mathieson Alkali	42	43½
Merck & Co.	*84	83
National Lead	115	115
National Lead pfd	109½	111
New Jersey Zinc	154	154
Parke, Davis & Co.	79	*79
Pennsylvania Salt	*80	*80
Procter & Gamble	*130	*128
Sherwin-Williams	28	29
Sherwin-Williams pfd.	*101½	*102
Tenn. Copper & Chem.	9¼	9⅜
Texas Gulf Sulphur	57½	57⅜
Union Carbide	54½	55
United Drug	79	80
U. S. Industrial Alcohol	47½	49
U. S. Industrial Alcohol pfd.	100	*101
Va.-Car Chem. Co.	7⅜	9
Va.-Car Chem. pfd.	21¾	24⅛

*Nominal. Other quotations based on last sale.

Vegetable Oils and Fats

Refined Cottonseed Unsettled—Spot Linseed Lower—Coconut Off on Coast—Soya Bean Declines

DESPITE the unsettled state of the market some of the larger consumers showed a little more interest in futures. According to traders quite a number of manufacturers will have to come into the market for last quarter requirements, but, in view of the favorable outlook for raw materials on the basic oils, the ideas of buyers are said to be rather low. Considerable interest was shown in the action of coconut oil, the decline in price resulting in some business. Crude soya was weak, reflecting the recent drop in cottonseed and linseed oils. Tallow sold at unchanged prices. Fish oil was lower.

Cottonseed Oil—The option market on the Produce Exchange established new lows for the movement, but before the close of the week prices steadied just a little. On the recovery shorts were the principal buyers. One refiner was credited with supporting the nearby positions. August oil, refined, sold under 10c. on the drop. December sold down to 8.21c. per lb. Crop news was mostly favorable and the speculative element could not be interested in the long side of the market. Reports on the state of trade in the different cash products were conflicting and prices named covered a wide range. However, refiners look for July business to show improvement over June. Salad oil was traded in at 11¾@12¼c. per lb., in bbl., immediate shipment. The sardine packers have been taking on oil. Bleachable oil sold recently at 9⅝c. per lb. delivered to a point nearby, but late in the week 9¾c. was the asking price on tank car business, f.o.b. New York. Crude oil for immediate shipment from the south settled at 8c. per lb., f.o.b. mills, with August at 7⅞c. September shipment from Texas was offered at 7¼c. October-December crude settled at 6½@6¾c. per lb., tank car basis, f.o.b. mills, Texas.

Linseed Oil—Argentine seed came in lower and with no improvement in the demand for oil prices were unsettled all week. Prompt shipment linseed oil sold at 98c. per gal., in bbl., carload basis, while on August deliveries business went through at 97c. per gal. Resale oil again was offered freely and some of this sold on the basis of 95c. per gal., immediate delivery. Imported oil on spot sold at 90c. per gal, duty paid. Crushers say that linseed oil actually sold down to 73c. per gal., in tanks, November-April shipment, equal to 78c. per gal., in cooperage. However, at the close of the week 80c. was regarded inside on November forward business, cooperage basis. October-November-December was offered at 82 @83c. per gal. Crop reports from the American northwest were favorable. Private estimates on the flaxseed output for this season were not quite up to the 18,000,000 bu. mark set by the Department of Agriculture. Canadian crop advices were favorable and, while the acreage is about the same as last season, the yield per acre, from present indications, may be larger. Shipments of flaxseed from the Argentine since the first of the year have reached the total of 37,000,000 bu., so that estimates of an exportable surplus of only 40,000,000 bu. from the last crop appear a little small. This, was accepted, in linseed circles, as a bearish development. The linseed cake market was inactive and shipment prices held around $35@$36 per ton, f.a.s. New York.

China Wood Oil—Spot quotations in New York were slightly under the prevailing cost of import, ranging from 21½@23c. per lb. Demand was dull. On the coast several cars of distressed material were available at concessions. One importer held out for 24c. per lb. on July-August shipment from the Orient.

Coconut Oil—Several cars of Ceylon type oil sold at 7½c. per lb., f.o.b. Pacific coast, a decline of ¼c. Manila oil for shipment, in bulk, was offered down to 7⅝c. per lb., c.i.f. coast, with rumors of trading on this basis. In New York Ceylon oil held at 8c. asked, sellers' tanks.

Corn Oil—Crude corn oil sold down to 7¼c. in the middle-west but later bids at 7½c. brought out no sellers.

Olive Oil Foots—The spot market was unsettled, closing at 8⅜@8⅝c. per lb. Several parcels arrived from Italy and a little pressure was in evidence. On futures 8⅝c. represented the market.

Palm Oils—Tin plate manufacturers showed buying interest in Lagos oil. The market for Lagos for shipment held at 7¼c. per lb., while on spot 7c. could have been done. Niger sold down to 6½c. on spot recently, but towards the close of last week it was doubtful whether 6¾c. could be done. Niger for shipment settled at 6.90c. per lb.

Rapeseed Oil — Distressed parcels were disposed of around 76c. per gal. The market closed steady at 77@77½c. per gal. for the refined.

Soya Bean Oil—The market was weak. One lot sold at 8½c. per lb., delivered to a point in the middle-west. On the coast 8½c. was asked on crude oil, sellers' tanks, duty paid. The New York market settled at 8¾@9c. per lb., sellers' tanks, duty paid. On bulk business for shipment from the Orient, in bond, 6c. could have been shaded.

Menhaden Oil—There were offerings at 40c. per gal., tank cars, f.o.b. fish factory, a decline of 5c. for the week. Demand was slow and with fishing fair and continued weakness in competing oils and fats, sentiment favored buyers.

Oleo Stearine—Sales went through at 9½c. per lb., an advance of ¼c. No. 1 oleo oil was offered at 11¾c. per lb.

Tallow and Greases—Extra tallow sold to soapers at 6¾c. per lb., delivered, equal to 6.60c. ex-plant. The market was steady in the west and Chicago reported sales in prime packer at 6¾c. per lb. Yellow grease of fair quality held at 5⅝c. per lb. There was some export call for tallow and greases.

Miscellaneous Materials

Casein—Distressed material was offered at concessions and this resulted in a very irregular market. Nominal quotations for spot material ranged from 14@15c. per lb.

Glycerine—The feature was the firmer position of crude and dynamite. It was reported that bids for dynamite glycerine at 15¼c. per lb. brought out no sellers. The asking price for dynamite in some quarters was nearer 15¾c. per lb., carload basis. Crude soap-lye settled at 10½c. bid, basis 80 per cent, loose, f.o.b. shipping point. Saponification, 88 per cent, loose, held around 12½c. per lb., with no sales reported. In the chemically pure prices ranged from 16@16½c. per lb., in drums, carload basis, according to seller and position. Trading in chemically pure glycerine was quiet.

Lithopone—Domestic producers continued to quote 7c. per lb., in bags, carload lots, nearby positions. With no change in the barytes situation the undertone remains steady.

Naval Stores—Higher primary markets, caused by smaller receipts and slight improvement in business, brought out an advance of 3@4c. per gal. in spirits of turpentine. Closing prices on spirits ranged from 97½c.@98c. per gal. Rosins also steadied, the market for the lower grades settling at $5.85@$5.90 per bbl. Larger consumers showed a little more buying interest.

Shellac—With cables from Calcutta higher, and moderate improvement in business, offerings are no longer pressing on the market and some traders were inclined to advance prices. T. N. on spot settled at 53@54c. per lb. Bleached, bonedry, immediate delivery, closed around 63@64c. per lb.

White Lead—There was a firmer feeling in the metal and this dispelled some of the bearish talk regarding prices for the lead pigments. Corroders reported a fair volume of buying, considering the season of the year, and expect new contract buying in another month or so. Standard dry white lead, in casks, carload lots, held at 9¼c. per lb. Red lead, dry, was unchanged at 11¼c. per lb. Litharge, in casks, 10⅜@10½c. per lb.

Zinc Oxide — Leading producers reported the market unchanged. Business has been less active, due chiefly to the curtailed production of rubber tires, etc. American process, lead free, settled at 8c. per lb. French process, red seal, 9⅞c. per lb.

Talc—California, 200 mesh, was offered at $18@$25 per ton, bags extra, f.o.b. shipping point. In New York double air floated closed at $14.75.

Imports at the Port of New York

July 20 to July 26

ACIDS—Citric—200 csk., Palermo, C. Huisking, Inc. **Cresylic**—46 dr., Liverpool, Jordan & Bros.; 31 dr., Liverpool, Order. **Formic**—77 dr., Hamburg, E. Suter & Co. **Oxalic**—20 bbl., Hamburg, Schering & Glatz. **Stearic**—12 bg., Rotterdam, Lamont, Corliss & Co. **Tartaric**—200 csk., Bremen, Order.

AMMONIUM PERSULPHATE — 6 cs., Bremen, Scientific Materials Co.

AMMONIUM CARBONATE — 15 csk., Liverpool, Order.

ALCOHOL—425 bbl. denatured, Arecibo, C. Esteva; 25 bbl. do., Arecibo, M. Feigel & Bros.; 2 dr., Havre, Irving Bank-Col. Trust Co.

ANTIMONY REGULUS—250 cs., Hankow, Nassau Smelting & Refining Co.; 250 cs. Hankow, East Asiatic Co.

ANTIMONY SULPHURET—1 csk., Newcastle, E. Hills' Son & Co.

ARSENIC—200 csk., Hamburg, Ore & Chemical Corp.; 217 bbl., Tampico, American Smelting & Refining Co.; 93 bbl., Tampico, American Metal Co.

ASBESTOS—644 bg., Southampton, W. D. Crumpton & Co.,

BARYTES—200 bg., Bremen, New York Trust Co.

BRONZE POWDER — 21 cs., Bremen, Davies, Turner & Co.; 19 cs., Bremen, Fuchs & Lang Mfg. Co.; 32 cs., Bremen, Baer Bros.

CALCIUM ARSENATE—300 csk., Hamburg, Order.

CAMPHOR—100 cs., Hamburg, A. Ochse Co.; 50 cs., Hong Kong, F. A. Cundill & Co.

CASEIN—834 bg., Buenos Aires, Order.

CHALK—600,000 kilos, Dunkirk, J. W. Higman Co.; 499 bg., Antwerp, Bankers' Trust Co.; 600 bg. and 25 csk. precipitated, Bristol, H. J. Baker & Bro.

CHEMICALS—216 pkg., Hamburg, Jungmann & Co.; 45 bbl., Hamburg, Unexcelled Mfg. Co.; 30 bbl., Hamburg, Hummell & Robinson Corp.; 50 bbl., Hamburg, A. J. Marcus; 766 pkg., Hamburg, Roessler & Hasslacher Chem. Co.; 250 dr., 16 keg and 10 csk., Bremen, Pfaltz & Bauer; 929 csk., Rotterdam, Hummel & Robinson Corp.; 200 csk., Rotterdam, Am. Exchange Nat'l Bank; 20 cs., Rotterdam, Order; 102 pkg., Hamburg, Hummel & Robinson Corp.; 10 bbl., Bremen, Order.

CHINA CLAY—26 csk., Bristol, English China Clays.

COAL-TAR PRODUCTS—11 csk., Hamburg, Kuttroff, Rickhardt & Co.

CUTCH—3,700 bg., Singapore, Order.

COLORS — 19 csk. earth, Hamburg, Reichard-Coulston, Inc.; 10 csk. aniline, Hamburg, Sarle & Co.; 4 csk. do., Hamburg, H. A. Metz & Co., 2 csk. do., Hamburg, A. H. Mayer; 4 bbl. earth, Hamburg, A. Hurst & Co.; 47 csk. aniline, Havre, Ciba Co.; 39 csk. aniline, Genoa, Irving Bank-Col. Trust Co.; 5 csk. do, Genoa, Order; 10 csk., Southampton, Order; 54 pkg. aniline, Havre, Ciba Co.; 3 csk. do, Havre, Carbic Color & Chem. Co.; 67 csk. red earth, Bristol, Reichard-Coulston, Inc.; 67 pkg. earth, Bristol, Order; 5 bbl. aniline, Hamburg, Fezandie & Sperrle; 3 bbl. do., Hamburg, Sigmund Ulmann Co.; 3 pkg. aniline, Rotterdam, H. A. Metz & Co.; 35 pkg. lampblack, Antwerp, L. H. Butcher & Co.; 9 csk., Hamburg, Grasselli Chemical Co.; 77 csk. earth, Bremen, Heller & Merz Co.; 26 cs., Bremen, P. & P. Chemical Co.

COPPER SULPHATE—10 csk., Bristol, Order.

COPRA—97 bg., Belize, Franklin Baker & Co.; 200 bg., Port Antonio, Order.

CREAM TARTAR—100 csk., Marseilles, Brown Bros. & Co.; 100 csk., Rotterdam, Order.

DYES—15 csk. aniline, Antwerp, Geigy Co.

DIVI-DIVI—951 bg., Curacao, Selma Merc. Co.

DEXTRINE — 100 bg., Copenhagen, Stein, Hall & Co.

EPSOM SALT—1,500 bg., Hamburg, Superfos Co.

FERROMANGANESE — 210 cs., Havre, De Courcy Browne.

FERRO-CHROME — 126 csk., Gothenburg, Hardy & Ruperti.

FERROSILICON—16 csk., Genoa, Order.

FUSEL OIL—13 bbl., Dunkirk, Maas & Waldstein; 8 dr., Dunkirk, Order; 3 dr., Antwerp, Order; 4 dr. Belfast, Order.

FULLERS EARTH—100 bg., Bristol, L. A. Salmon & Bros.

GAMBIER—253 cs., Singapore, L. Littlejohn & Co.

GLAUBER SALT — 105 csk., Hamburg, Bengol Trading Co.; 80 bbl., Hamburg, A. J. Marcus, Inc.; 131 csk., Hamburg, Order.

GLYCERINE—70 csk., Marseilles, Order; 58 dr, Buenos Aires, Core & Herbert.

GUMS—301 bg. copal, Singapore, Guaranty Trust Co.; 147 bg. copal, Singapore, Brown Bros. & Co.; 150 pkg. copal and 24 bg. damar, Singapore, Kidder, Peabody & Co.; 280 bg. copal, Singapore, L. C. Gillespie & Sons; 388 bg. copal, Singapore, France, Campbell & Darling; 84 bg. copal, Singapore, Order; 150 cs. elemi, Manila, Order; 100 bg. copal, Antwerp, Central Union Trust Co.; 105 bg. do., Antwerp, Brown Bros. & Co., 670 pkg. copal, Macassar, Irving Bank-Col. Trust Co.; 75 bg. copal, Macassar, American Exchange Nat'l Bank; 357 pkg. do., Macassar, Kidder, Peabody Accept. Corp.; 2,429 pkg. do., Macassar, Order; 1,000 cs. damar, Padang, Order; 41 cs. copal, Marseilles, Davies, Turner & Co.; 210 bg. copal, Singapore, Chemical Nat'l Bank; 70 bg. do., Singapore, Guaranty Trust Co.; 280 bg. do., Singapore, L. C. Gillespie & Sons; 150 cs. do., Singapore, Baring Bros. & Co.; 308 bg. do., Singapore, Order; 40 bg. copal, Antwerp, Brown Bros. & Co.; 270 cs. damar, Singapore, Order; 1,450 cs. damar, Batavia, Order.

INFUSORIAL EARTH — 524 bg., Algiers, Janovici & Co.

IRON OXIDE—95 csk., Hull, J. L. Smith & Co.; 80 bbl., Malaga, J. M. Rabassa; 228 bbl., Malaga, Hummell & Robinson Corp.; 80 bbl., Malaga, S. L. Libby Corp.; 423 bg., Malaga, J. L. Smith & Co.; 61 bbl., Malaga, E. M. & F. Waldo; 95 csk., Liverpool, Reichard-Coulston, Inc.; 30 csk., Liverpool, J. A. McNulty; 20 csk., Liverpool, J. H. Rhodes & Co.

IRON ORE—11,000 tons hematite, Dalquiri, Bethlehem Cuba Iron Mines Co.

LATEX—170 tons liquid, Belawan, General Rubber Co.

LIME CITRATE—50 csk., Naples, Exchange Products Co.

LOGWOOD—420,500 lb., Miragoane, W. & A. Leaman; 123 bbl. liquid, Cape Haitian, Logwood Mfg. Co.

LITHOPONE—100 csk., Hamburg, Brown & Roese.

MAGNESIUM—210 cs. citrate, Genoa, Order; 60 cs. calcined, Newcastle, Order; 250 bg. calcined, Rotterdam, H. J. Baker & Bros.; 100 csk. silicate, Hamburg, Order.

MAGNESITE—521 bg. and 115 bbl., Rotterdam, Speiden, Whitfield Co.

NAPHTHALENE — 547 bg., Bristol, Order.

OCHER—250 bbl., Marseilles, Reichard-Coulston, Inc.; 88 csk., Marseilles, Medit. & General Traders; 74 csk., Marseilles, Gledhill & Co.

OILS—China Wood—100 dr., Hong Kong, Order; 366 csk., Hankow, Jardine, Matheson & Co. **Cod**—125 csk., St. Johns, R. Badcock & Co.; 200 bbl., Hull, Order. **Coconut**—664,087 kilos (bulk), Manila, Order **Fish**—100 bbl., Hull, J. D. Irwin & Co. **Linseed**—220 bg. oxidised, Nairn Linoleum Co.; 147 bbl., Hull, Smith, Weihman Oil Co.; 289 bbl., Hull, J. C. Francesconi & Co.; 50 bbl., Hull, Order; 176 bbl., Rotterdam, Welch, Holme & Clark Co. **Olive Oil Foots**—100 bbl., Naples, Mechanics & Metals National Bank; 100 bbl., Catania, Order; 100 bbl., Palermo, Order; 500 bbl., Naples, Order. **Palm**—159 csk., Rotterdam, J. Holt & Co. **Palm Kernel**—150 bbl., Liverpool, Order. **Rapeseed** — 500 bbl., Liverpool, Vacuum Oil Co.

OIL SEEDS—Castor—35 bg., Port de Paix, Huttlinger & Struller. **Linseed**—50,832 bg., Rosario, Spencer Kellogg & Sons; 1,857 bg., Montevideo, Order; 27,450 bg. and 1,695,634 kilos (bulk), Santa Fe, International Acceptance Bank; 12,680 bg. and 102,201 kilos (bulk), Santa Fe, Goldman, Sachs & Co.; 32,635 bg., Rosario, International Acceptance Bank; 2,655 bg., Rosario, American Linseed Co.; 8,707 bg., Buenos Aires, L. Dreyfus & Co.; 88,358 bg. and 2,084,960 kilos (bulk), Buenos Aires, Order.

PLUMBAGO—150 bbl., Colombo, N. Y. Trust Co., 31 bbl., Colombo, G. F. Pettinos.

POTASSIUM SALTS—109 pkg. permanganate, Hamburg, Roessler & Hasslacher Chemical Co.; 270 bbl. and 270 csk. caustic, Hamburg, Roessler & Hasslacher Chemical Co.; 2,997 bg. muriate, Bremen, Potash Importing Corp. of Am.; 300 bbl. chlorate, Marseilles, Asia Banking Corp.; 700 bbl. chlorate, Marseilles, Order; 300 csk. do., Marseilles, Order; 100 csk. perchlorate, Marseilles, Order; 400 bbl. perchlorate, Antwerp, Hummel & Robinson.

QUEBRACHO—1,950 bg. extract, Buenos Aires, National City Bank; 5,090 bg. do., Buenos Aires, Order; 6,463 bg., Buenos Aires, Fourth Atlantic National Bank of Boston; 15,163 bg., Buenos Aires, Int'l Products Co.

QUICKSILVER—194 flasks, Tampico, H. J. G. Mackie; 28 flasks, Tampico, M. D. Samos; 21 flasks, Tampico, Haas Bros.; 15 flasks, Tampico, J. Elizondo; 74 flasks, Vera Cruz, Poillon & Poirier.

SODIUM SALTS—159 dr. sulphite, Hamburg, C. S. Grant & Co.; 168 cs. cyanide, Marseilles, Asia Banking Corp.; 67 csk. phosphate, Antwerp, Brown Bros. & Co.; 100 dr. sulphite, Bristol, R. F. Downing & Co.; 120 cs. cyanide, Marseilles, Asia Banking Corp.; 130 dr. sulphide, Antwerp, E. M. Sergeant & Co.; 134 csk. phosphate, Antwerp, Roessler & Hasslacher Chem Co.; 23 csk. prussiate, Liverpool, H. J. Baker & Co.

SUMAC—140 bg, Palermo, Order.

TALC—200 bg., Genoa, Kountze Bros.; 500 bg., Genoa, Parfumes de Luxe Co.; 600 bg., Genoa, C. Mathieu; 300 bg., Genoa, Ital. Discount & Trust Co.

TARTAR—321 bg., Marseilles, C. Pfizer & Co.; 110 bg., Marseilles, Royal Baking Powder Co.; 455 sk., Marseilles, Order; 193 sk., Barcelona, Royal Baking Powder Co.; 67 bg., Aligante, Royal Baking Powder Co.; 105 csk., Leghorn, Order; 270 csk., Naples, Tartar Chemical Works.

WOOL GREASE—100 bbl., 40 cs. and 20 csk., Bremen, Pfaltz & Bauer.

WAXES—12 bg. bees, Leghorn, Order; 100 cs. vegetable, Hankow, Order; 11 bbl. bees, Santos, T. Norton & Co.; 20 bg. bees, Rio de Janeiro, London & Brazilian Bank; 8 bg. bees, Havana, Order; 4 pkg. do., Monte Christi; J. A. Thomen; 33 bg. carnauba, Para, Lazard Freres; 938 bg. do., Para, National City Bank; 56 bg. do., Para, Order; 41 bg. bees, Santiago, R. Desvernine.

WHITING—5,500 bg., Dunkirk, Taintor Trading Co.

ZINC OXIDE—100 bbl., Marseilles, Reichard-Coulston, Inc.; 250 bbl., Marseilles, Mechanics & Metals National Bank; 100 bbl., Marseilles, Order; 42 bbl., Antwerp, Philipp Bros.

ZINC WHITE — 100 bbl., Marseilles, Order.

ZINC SULPHATE — 3 cs., Liverpool, J. A. McNulty.

Margarine Production of Canada

In view of the recent action taken by the Parliament of Canada to ban the importation and manufacture of oleomargarine the following figures showing the production and importation of that product into Canada are of interest. They show that during the war years of 1918 and 1919, as well as during the following year, production and importation reached their highest points.

The production in Canada in 1922 amounted to more than 2,000,000 lb., and importations more than 1,000,000 lb., showing that oleomargarine had reached a point where it was to be considered a definite part of the country's commerce. During the first 5 months of this year, nearly 1,000,000 lb. was imported.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are for the spot market in New York City, but a special effort has been made to report American manufacturers' quotations whenever available. In many cases these are for material f.o.b. works or on a contract basis and these prices are so designated. Quotations on imported stocks are reported when they are of sufficient importance to have a material effect on the market. Prices quoted in these columns apply to large quantities in original packages.

General Chemicals

Acetone, drums	lb.	$0 25 – .25½
Acid, acetic, 28%, bbl.	100 lb.	3.38 – 3.50
Acetic, 56%, bbl.	100 lb.	6.75 – 7.00
Acetic, 80%, bbl.	100 lb.	9.58 – 9.83
Glacial, 99½%, bbl.	100 lb.	12.00 – 12.78
Acetic anhydride, 85%, dr.	lb.	.38 – ....
Boric, bbl.	lb.	.10½ – ....
Citric, kegs	lb.	.49 – .52
Formic, 85%	lb.	.12 – .14
Gallic, tech.	lb.	.45 – .50
Hydrofluoric, 52%, carboys	lb.	.11 – .12
Lactic, 44%, tech., light, bbl.	lb.	.11½ – .12
22% tech., light, bbl.	lb.	.05½ – .06
Muriatic, 18° tanks	100 lb.	.90 – 1.00
Muriatic, 20°, tanks,	100 lb.	1.00 – 1.10
Nitric, 36°, carboys	lb.	.04½ – .05
Nitric, 42°, carboys	lb.	.06 – .06½
Oleum, 20%, tanks	ton	18.50 – 19.00
Oxalic, crystals, bbl.	lb.	.12½ – .12¾
Phosphoric, 50% carboys	lb.	.07½ – .08½
Pyrogallic, resublimed	lb.	1.50 – 1.60
Sulphuric, 60°, tanks	ton	11.00 – 12.00
Sulphuric, 60°, drums	ton	13.00 – 14.00
Sulphuric, 66°, tanks	ton	15.00 – 16.00
Sulphuric, 66° drums	ton	20.00 – 21.00
Tannic, U.S.P., bbl.	lb.	.65 – .70
Tannic, tech., bbl.	lb.	.45 – .50
Tartaric, imp., powd., bbl.	lb.	.34½ – .35½
Tartaric, domestic, bbl.	lb.	.37½ – ....
Tungstic, per lb.	lb.	1.10 – 1.20
Alcohol, butyl, drums, f.o b. works	lb.	.26 – .28
Alcohol ethyl (Cologne spirit), bbl.	gal.	4.78 – ....
Ethyl, 190 p'f. U.S.P., bbl.	gal.	4.75 – ....
Alcohol, methyl (see Methanol)		
Alcohol, denatured, 190 proof		
No. 1, special bbl.	gal.	.44 – ...
No. 1, 190 proof, special, dr.	gal.	.38 – ...
No. 1, 188 proof, bbl	gal.	.45 – ...
No. 1, 188 proof, dr	gal.	.39 – ...
No. 5, 188 proof, bbl.	gal.	.43 – ...
No 5, 188 proof, dr	gal	.37 – ...
Alum, ammonia, lump, bbl.	lb.	.03½ – .03¾
Potash, lump, bbl.	lb.	.03 – .04½
Chrome, lump, potash, bbl.	lb.	.06 – .07
Aluminum sulphate, com., bags	100 lb.	1.40 – 1.50
Iron free bags	lb.	2.40 – 2.50
Aqua ammonia, 26°, drums	lb.	.07 – .07½
Ammonia, anhydrous, cyl.	lb.	.30 – .30½
Ammonium carbonate, powd. casks, imported	lb.	.09½ – .10
Ammonium carbonate, powd. domestic, bbl.	lb.	.13 – .14
Ammonium nitrate, tech., casks	lb.	.10 – .11
Amyl acetate tech., drums	gal.	4.50 – 4.75
Arsenic, white, powd., bbl.	lb.	.09 – .10
Arsenic, red, powd., kegs	lb.	.15 – .15½
Barium carbonate, bbl.	ton	65.00 – 70.00
Barium chloride, bbl.	ton	80.00 – 83.00
Barium dioxide, drums	lb.	.18 – .18½
Barium nitrate, casks	....	.08 – .08½
Blanc fixe, dry, bbl.	lb.	.04 – .04¼
Bleaching powder, f.o b. wks., drums	100 lb.	1.75 – 1.90
Spot N. Y. drums	100 lb.	2.20 – 2.30
Borax, bbl.	lb.	.05¼ – .05½
Bromine, cases	lb.	.28 – .30
Calcium acetate, bags	100 lb.	4.00 – 4.05
Calcium arsenate, dr.	lb.	.11½ – .15
Calcium carbide, drums	lb.	.05¼ – .05¾
Calcium chloride, fused, drums	ton	22.00 – 23.00
Gran. drums	ton	28.00 – 30.00
Calcium phosphate, mono, bbl.	lb.	.06½ – .07
Camphor, cases	lb.	.86 – .88
Carbon bisulphide, drums	lb.	.07 – .07½
Carbon tetrachloride, drums	lb.	.09½ – .10
Chalk, precip.—domestic, light, bbl.	lb.	.04½ – .04½
Domestic, heavy, bbl.	lb.	.03½ – .03¾
Imported, light, bbl.	lb.	.04½ – .05
Chlorine, liquid, tanks, wks.	lb.	.05¼ – .05½
Cylinders, 100 lb., wks	lb.	.06 – .06½
Cylinders, 100 lb., spot	lb.	.09 – ....
Chloroform, tech., drums	lb.	.35 – .38
Cobalt oxide, bbl.	lb.	2.10 – 2.25
Copperas, bulk, f.o.b. wks.	ton	20.00 – 21.00
Copper carbonate, bbl.	lb.	.18 – .19
Copper cyanide, drums	lb.	.47 – .50
Coppersulphate, dom., bbl.,	100 lb.	5.40 – 5 50
Imp. bbl	100 lb.	4.50 – 4.75
Cream of tartar, bbl.	lb.	.25 – .26
Epsom salt, dom., tech., bbl.	100 lb.	1.75 – 2.00
Epsom salt, imp., tech., bags	100 lb.	.90 – 1.00
Epsom salt, U.S.P., dom., bbl.	100 lb.	2.00 – 2.50
Ether, U.S.P., resale, dr.	lb.	.13 – .15
Ethyl acetate, 85%, drums.	gal.	.80 – .81
Ethy acetate, pure lether, 98% to 100%)	gal.	$0 95 – $1.00
Formaldehyde, 40%, bbl.	lb.	0 14 – 0 14½
Fullers earth—imp., powd., net	ton	30.00 – 32.90
Fusel oil, ref., drums	gal.	.... – ....
Fusel oil, crude, drums	gal.	3.75 – 4 00
Glaubers salt, wks., bags	100 lb.	1.20 – 1.40
Glaubers salt, imp., bags	100 lb.	.90 – .95
Glycerine, c.p., drums extra	lb.	.16 – .16½
Glycerine, dynamite, drums	lb.	.15¼ – .15½
Glycerine, crude 80%, loose	lb.	.10½ – ....
Iodine, resublimed	lb.	4.55 – 4.65
Iron oxide, red, casks	lb.	.12 – .18
Lead:		
White, basic carbonate, dry, casks	lb.	.09¼ – .09½
White, basic sulphate, casks	lb.	.08½ – .09
White, in oil, kegs	lb.	.11¼ – .11½
Red, dry, casks	lb.	.10¾ – .11½
Red, in oil, kegs	lb.	.13 – .14½
Lead acetate, white crys., bbl.	lb.	.14 – .14½
Brown, broken, casks	lb.	.13 – .13½
Lead arsenate, powd., bbl.	lb.	.20 – .21
Lime-Hydrated, bbl.	per ton	16.80 – 17.00
Lime, Lump, bbl	280 lb.	3.63 – 3.65
Litharge, comm., casks	lb.	.10¼ – .10½
Lithophone, bags	lb.	07 – .07¼
in bbl.	lb.	.07½ – .07¾
Magnesium carb., tech., bags	lb.	.08 – .08½
Methanol, 95%, bbl.	gal.	1.18 – 1.20
Methanol, 97%, bbl.	gal.	1.20 – 1.22
Methyl-acetone, t'ks	gal.	1.15 – ....
Nickel salt, double, bbl.	lb.	.10½ – ....
Nickel salts, single, bbl.	lb.	.11½ – ....
Phosgene	lb.	.60 – .75
Phosphorus, red, cases	lb.	.... – ....
Phosphorus, yellow, cases	lb.	.35 – .40
Potassium bichromate, casks	lb.	.10½ – .11
Potassium bromide, gran., bbl.	lb.	.19 – .20
Potassium carbonate, 80-85%, calcined, casks	lb.	.06¼ – .06½
Potassium chlorate, powd.	lb.	.07 – .08½
Potassium cyanide, drums	lb.	.47 – .52
Potassium, first sorts, cask	lb.	.08 – .08½
Potassium hydroxide (caustic potash) drums	lb.	.07½ – .09
Potassium iodide, cases	lb.	3.65 – 3.75
Potassium nitrate, bbl.	lb.	.06½ – .07½
Potassium permanganate, drums	lb.	.16½ – .17½
Potassium prussiate, red, casks	lb.	.64 – .65
Potassium prussiate, yellow, casks	lb.	.30 – .33
Salammoniac, white, gran., casks, imported	lb.	.05¾ – .06
Salammoniac, white, gran., b'l., domestic	lb.	.07¼ – .07¾
Gray, gran., casks	lb.	.08 – .09
Salsoda, bbl.	100 lb.	1.20 – 1.40
Salt cake (bulk)	ton	26.00 – 28.00
Soda ash, light, 58% flat, bags, contract	100 lb.	1.45 – 1.50
Soda ash, light, 58%, flat, bags, resale	100 lb.	1.70 – 1.75
Soda ash, dense, bags, contract, basis 58%	100 lb.	1.51 – ....
Soda ash, dense, in bags, resale	100 lb.	1.85 – 1.90
Soda, caustic, 76%, solid, drums	100 lb.	3.16½ – ....
Soda, caustic, ground and flake, contracts	100 lb.	3.60 – 3.85
Soda, caustic, ground and flake, resale	100 lb.	3.72½ – ....
Sodium acetate, works, bags	lb.	.05½ – .05¾
Sodium bicarbonate, bbl.	100 lb.	2.00 – 2.50
Sodium bichromate, casks	lb.	.07½ – .08
Sodium bisulphate (niter cake)	ton	6.00 – 7.00
Sodium bisulphite, powd., U.S.P., bbl.	lb.	.04¼ – .04½
Sodium chlorate, kegs	lb.	.06½ – .07
Sodium chloride	long ton	12.00 – 13.00
Sodium cyanide, cases	lb.	.19 – .22½
Sodium fluoride, bbl.	lb.	$0.08½ – $0.10½
Sodium hyposulphite, bbl.	lb.	.02½ – .03
Sodium nitrite, casks	lb.	07 – .07½
Sodium peroxide, powd., cases	lb.	.28 – .30
Sodium phosphate, dibasic, bbl.	lb.	.03½ – .04
Sodium prussiate, yel. drums	lb.	.13½ – .15½
Sodium salicylic, drums	lb.	.45 – .52
Sodium silicate (40°, drums)	100 lb.	.75 – 1.15
Sodium silicate (60°, drums)	100 lb.	1.75 – 2.00
Sodium sulphide, fused, 60-62% drums	lb.	.04½ – .04¾
Sodium sulphite, crys., bbl.	lb.	.03½ – .03¾
Strontium nitrate, powd., bbl.	lb.	.10 – .11
Sulphur chloride, yel drums.	lb.	.04½ – .05
Sulphur, crude	ton	18.00 – 20.00
At mine, bulk	ton	16.00 – 18.00
Sulphur, flour, bag	100 lb.	2.25 – 2.35
Sulphur, roll, bag	100 lb.	2.00 – 2.10
Sulphur dioxide, liquid, cyl.	lb.	.08 – .08½
Talc—imported, bags	ton	30.00 – 40.00
Talc—domestic powd., bags.	ton	18.00 – 25.00
Tin bichloride, bbl.	lb.	.11½ – .12
Tin oxide, bbl.	lb.	.45 – .....
Tin crystals, bbl.	lb.	.30½ – .31
Zinc carbonate, bags	lb.	.14 – .14½
Zinc chloride, gran, bbl.	lb.	.06½ – .06¾
Zinc cyanide, drums	lb.	.37 – .38
Zinc oxide, , lead free, bbl.	lb.	.08 – .08½
5% lead sulphate, bags	lb.	.07½ – ......
10 to 35 % lead sulphate, bags	lb.	.07 – ......
French, red seal, bags	lb.	.09¾ – ......
French, green seal, bags	lb.	.10¾ – ......
French, white seal, bbl	lb.	.12 – ......
Zinc sulphate, bbl.	100 lb.	2.50 – 3.00

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	$0.60 – $0.70
Alpha-naphthol, ref., bbl.	lb.	.68 – .80
Alpha-naphthylamine, bbl.	lb.	.34 – 36
Aniline oil, drums	lb.	.16 – .16½
Aniline salts, bbl.	lb.	.23 – .24
Anthracene, 80%, drums	lb.	.75 – 1.00
Anthracene, 80%, imp., drums, duty paid	lb.	.70 – .75
Anthraquinone, 25%, paste, drums	lb.	.70 – .75
Benzaldehyde U.S.P., carboys	lb.	1.45 – 1.50
tech, drums	lb	75 .....
Benzene, pure, water-white, tanks and drums	gal.	.27 – .32
Benzene, 90%, tanks & drums	gal.	.25 – .30
Benzene, 90%, drums, resale	gal.	.28 – .32
Benzidine base, bbl.	lb.	.80 – .85
Benzidine sulphate, bbl.	lb.	.70 – .75
Benzoic acid, U.S.P., kegs	lb.	.75 – 80
Benzoate of soda, U.S.P., bbl.	lb.	.57 – 65
Benzyl chloride, 95-97%, ref., drums	lb.	.45 – ...
Benzyl chloride, tech., drums	lb.	.30 – ..35
Beta-naphthol, tech., bbl.	lb.	.21 – .22
Beta-naphthylamine, tech	lb.	.80 – .90
Cresol, U.S.P., drums	lb.	.25 – .29
Ortho-cresol, drums	lb.	.28 – .32
Cresylic acid, 97%, resale, drums	gal.	.90 – 1.00
95-97%, drums, resale	gal.	.88 – .90
Dichlorbenzene, drums	lb.	.07 – .09
Diethylaniline, drums	lb.	.50 – .60
Dimethylaniline, drums	lb.	.41 – .42
Dinitrobenzene, bbl.	lb.	.19 – .20
Dinitroclorbenzenee bbl.	lb.	.22 – .23
Dinitronaphthalen, bbl.	lb.	.30 – .32
Dinitrophenol, bbl.	lb.	.35 – .40
Dinitrotoluene, bbl.	lb.	.20 – .22
Dip oil, 25%, drums	gal.	.25 – .30
Diphenylamine, bbl.	lb.	.50 – .52
H-acid, bbl.	lb.	.75 – .80
Meta-phenylenediamine, bbl.	lb.	1.00 – 1 05
Michlers ketone, bbl.	lb.	3.00 – 3.50
Monochlorbenzene, drums	lb.	.08 – .10
Monoethylaniline, drums	lb.	.95 – 1.10
Naphthalene, flake, bbl.	lb.	.07 – .07½
Naphthalene, balls, bbl.	lb.	.07½ – .07¾
Naphthionate of soda, bbl.	lb.	.58 – .65
Naphthionic acid, crude, bbl.	lb.	.52 – .55
Nitrobenzene, drums	lb.	.10 – .12
Nitro-naphthalene, bbl.	lb.	.30 – .35
Nitro-toluene, drums	lb.	.13½ – .14½
N-W acid, bbl.	lb.	1.25 – 1.30
Ortho-amidophenol, kegs	lb.	2.30 – 2.35
Ortho-dichlorbenzene, drums	lb.	.17 – .20
Ortho-nitrophenol, bbl.	lb.	.90 – .92
Ortho-nitrotoluene, drums	lb.	.10 – .12
Ortho-toluidine, bbl.	lb.	.13½ – .14½
Para-amidophenol, base, kegs	lb.	1.20 – 1.30
Para-amidophenol, HCl, kegs	lb.	1.25 – 1.35
Para-dichlorbenzene, bbl.	lb.	.17 – .20
Paranitroaniline, bbl.	lb.	.68 – .72
Para-nitrotoluene, bbl.	lb.	.60 – .65
Para-phenylenediamine, bbl.	lb.	1.45 – 1.50
Para-toluidine, bbl	lb.	.90 – .95
Phthalic anhydride, bbl.	lb.	.35 – .38
Phenol, U.S.P., dr.	lb.	.30 – .35
Picric acid, bbl.	lb.	.20 – .22
Pyridine, dom., drums	gal.	nominal

Pyridine, imp., drums	gal.	$3.80 - $3.90
Resorcinol, tech., kegs	lb.	1.50 - 1.60
Resorcinol, pure, kegs	lb.	2.25 - ....
R-salt, bbl.	lb.	.55 - .60
Salicylic acid, tech., bbl.	lb.	.37 - .42
Salicylic acid, U.S.P., bbl.	lb.	.40 - ....
Solvent napthha, water-white, tanks	gal.	.27 - ....
Crude, tanks	gal.	.24 - ....
Sulphanilic acid, crude, bbl.	lb.	.18 - .20
Thiocarbanilide, kegs	lb.	.35 - .38
Toluidine, kegs	lb.	1.20 - 1.30
Toluidine, mixed, kegs	lb.	.30 - .35
Toluene, tank cars	gal.	.30 - .32
Toluene, drums	gal.	.34 - .36
Xylidines drums	lb.	.49 - .50
Xylene, pure, drums	gal.	.65 - .70
Xylene, com., drums	gal.	.37 - ....
Xylene, com., tanks	gal.	.32 - ....

Naval Stores

Rosin B-D, bbl.	280 lb.	$5.85 - ....
Rosin E-I, bbl.	280 lb.	5.95 - ....
Rosin K-N, bbl.	280 lb.	6.00 - 6.10
Rosin W.G.-W.W., bbl.	280 lb.	6.25 - 7.25
Wood rosin, bbl.	280 lb.	5.90 - 6.00
Turpentine, spirits of, bbl.	gal.	.98 - .99
Wood, steam dist., bbl.	gal.	.75 - ....
Wood, dest. dist., bbl.	gal.	.60 - ....
Pine tar pitch, bbl.	200 lb.	.... - 6.00
Tar, kiln burned, bbl.	500 lb.	.... - 12.00
Retort tar, bbl.	500 lb.	.... - 11.50
Rosin oil, first run, bbl.	gal.	.42 - ....
Rosin oil, second run, bbl.	gal.	.45 - ....
Rosin oil, third run, bbl.	gal.	.50 - ....
Pine oil, steam dist.	gal.	.70 - ....
Pine oil, pure, dest. dist.	gal.	.65 - ....
Pine tar oil, ref.	gal.	.48 - ....
Pine tar oil, crude, tanks f.o.b. Jacksonville, Fla.	gal.	.32 - .32½
Pine tar oil, double ref., bbl.	gal.	.... - .75
Pine tar, ref., thin, bbl.	gal.	.... - .25
Pinewood creosote, ref., bbl.	gal.	.... - .52

Animal Oils and Fats

Degras, bbl.	lb.	$0.03¾ - $0.04½
Grease, yellow, bbl.	lb.	.05¼ - .06
Lard oil, Extra No. 1, bbl.	gal.	.80 - .85
Neatsfootoil 20 deg. bbl.	gal.	1.30 - ....
No. 1, bbl.	gal.	.92 - .94
Oleo Stearine		.09¾ - .10
Red oil, distilled, d.p. bbl.	lb.	.08¼ - .09
Saponified, bbl.	lb.	.08½ - .09
Tallow, extra, loose	lb.	.06¾ - ....
Tallow oil, acidless, bbl.	gal.	.92 - .94

Vegetable Oils

Castor oil, No. 3, bbl.	lb.	$0.13½ - ....
Castor oil, No. 1, bbl.	lb.	.14 - ....
Chinawood oil, bbl.	lb.	.22 - .23
Coconut oil, Ceylon, bbl.	lb.	.09 - .09¼
Ceylon, tanks, N.Y.	lb.	.08 - .08¾
Coconut oil, Cochin, bbl.	lb.	.09½ - .09½
Corn oil, crude, bbl.	lb.	.09½ - ....
Crude, tanks, (f.o.b. mill)	lb.	.07¾ - .07¾
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.08 - ....
Summer yellow, bbl.	lb.	.10¾ - .11
Winter yellow, bbl.	lb.	.11¼ - .12
Linseed oil, raw, car lots, bbl.	gal.	.98 - ....
Raw, tank cars (dom.)	gal.	.93 - ....
Boiled, cars, bbl. (dom.)	gal.	1.00 - ....
Olive oil, denatured, bbl.	gal.	1.05 - 1.10
Sulphur, (foots) bbl.	lb.	.08¼ - .08½
Palm, Lagos, casks	lb.	.06¾ - .07
Niger casks	lb.	.06½ - ....
Palm kernel, bbl.	lb.	.08¼ - .08½
Peanut oil, crude, tanks (mill)	lb.	.10½ - ....
Peanut oil, refined, bbl.	lb.	.14¼ - .15
Perilla, bbl.	lb.	.15¼ - .15½
Rapeseed oil, refined, bbl.	gal.	.76½ - .77½
Rapeseed oil, blown, bbl.	gal.	.82 - ....
Sesame, bbl.	lb.	.11½ - .11¾
Soya bean (Manchurian), bbl.	lb.	.10 - ....
Tank, f.o.b. Pacific coast	lb.	.08¾ - .09
Tank, (f.o.b. N.Y.)	lb.	.09 - .09¼

Fish Oils

Cod, Newfoundland, bbl.	gal.	$0.63 - ....
Menhaden, light pressed, bbl.	gal.	.65 - ....
White bleached, bbl.	gal.	.68 - ....
Blown, bbl.	gal.	.72 - ....
Crude, tanks (f.o.b. factory)	gal.	.40 - ....
Whale No. 1 crude, tanks, coast	lb.	.... - ....
Winter, natural, bbl.	gal.	.76 - .78
Winter, bleached, bbl.	gal.	.79 - .80

Oil Cake and Meal

Coconut cake, bags	ton	$26.00 - $28.00
Copra, sun dried, bags, (c.i.f.)	lb.	.04¾ - .05
Sun dried Pacific coast	lb.	.04¼ - .04½
Cottonseed meal, f.o.b. mills	ton	38.00 - ....
Linseed cake, bags	ton	35.00 - 36.00
Linseed meal, bags	ton	37.00 - 38.00

Dye & Tanning Materials

Albumen, blood, bbl.	lb.	$0.45 - $0.50
Albumen, egg, tech, kegs	lb.	.95 - .97
Cochneal, bags	lb.	.33 - .35
Cutch, Borneo, bales	lb.	.04½ - .04¾
Cutch, Rangoon, bales	lb.	.13 - .13½
Dextrine, corn, bags	100 lb.	3.79 - 4.06
Dextrine, gum, bags	100 lb.	4.14 - 4.34
Divi-divi, bags	ton	38.00 - 39.00
Fustic, sticks	ton	30.00 - 35.00
Fustic, chips, bags	lb.	.04 - .05
Logwood, sticks	ton	26.00 - 30.00
Logwood, chips, bags	lb.	.02½ - .03½
Sumac, leaves, Sicily, bags	ton	70.00 - 72.00
Sumac, ground, bags	ton	$65.00 - $67.00
Sumac, domestic, bags	ton	40.00 - 42.00
Starch, corn, bags	100 lb.	3.22 - 3.49
Tapioca flour, bags	lb.	.07 - .07½

Extracts

Archil, conc., bbl.	lb.	$0.18 - $0.22
Chestnut, 25% tannin, tanks	lb.	.02 - .03
Divi-divi, 25% tannin, bbl.	lb.	.04 - .05
Fustic, crystals, bbl.	lb.	.20 - .22
Fustic, liquid, 42°, bbl.	lb.	.08 - .09
Gambier, liq., 25% tannin, bbl.	lb.	.08 - .09
Hematine crys., bbl.	lb.	.14 - .18
Hemlock, 25% tannin, bbl.	lb.	.03¾ - .04½
Hypernic, solid, drums	lb.	.24 - .26
Hypernic, liquid, 51°, bbl.	lb.	.09½ - .10½
Logwood, crys., bbl.	lb.	.17 - .18
Logwood, liq., 51°, bbl.	lb.	.08¼ - .09
Quebracho, solid, 65% tannin, bbl.	lb.	.04¾ - .05
Sumac, dom., 51°, bbl.	lb.	.06½ - .07

Dry Colors

Blacks-Carbongas, bags, f.o.b. works, spot	lb.	$0.17 - $0.21
Lampblack, bbl.	lb.	.12 - .40
Mineral, bulk	ton	35.00 - 45.00
Blues-Bronze, bbl.	lb.	.55 - .60
Prussian, bbl.	lb.	.55 - .60
Ultramarine, bbl.	lb.	.08 - .35
Browns, Sienna, Ital., bbl.	lb.	.06 - .14
Sienna, Domestic, bbl.	lb.	.03½ - .04
Umber, Turkey, bbl.	lb.	.04 - .04½
Greens-Chrome, C.P. Light, bbl.	lb.	.32 - .34
Chrome, commercial, bbl.	lb.	.12 - .12½
Paris, bulk	lb.	.25 - .28
Reds, Carmine No. 40, tins	lb.	4.50 - 4.70
Oxide red, casks	lb.	.10 - .14
Para toner, kegs	lb.	1.00 - 1.10
Vermilion, English, bbl.	lb.	1.25 - 1.28
Yellow, Chrome, C.P. bbls.	lb.	.20 - .21
Ocher, French, casks	lb.	.02½ - .03

Waxes

Bayberry, bbl.	lb.	$0.30 - $0.32
Beeswax, crude, bags	lb.	.21 - .21½
Beeswax, refined, light, bags	lb.	.32 - .34
Beeswax, pure white, cases	lb.	.40 - .41
Candellila, bags	lb.	.20 - .21
Carnauba, No. 1, bags	lb.	.41 - .42
No. 2, North Country, bags	lb.	.23 - .23½
No. 3, North Country, bags	lb.	.17¾ - .18¼
Japan, cases	lb.	.16 - .16¼
Montan, crude, bags	lb.	.04¼ - .04½
Paraffine, crude, match, 105-110 m.p.	lb.	.04 - .04¼
Crude, scale 124-126 m.p., bags	lb.	.02¾ - .03
Ref., 118-120 m.p., bags	lb.	.03 - .03½
Ref., 125 m.p., bags	lb.	.03½ - .03¾
Ref, 128-130 m.p., bags	lb.	.03¾ - .03¾
Ref., 133-135 m.p., bags	lb.	.04½ - [illegible]
Ref., 135-137 m.p., bags	lb.	.05¼ - .05½
Stearic acid, sgle pressed, bags	lb.	.12¼ - .12½
Double pressed, bags	lb.	.12¾ - .13
Triple pressed, bags	lb.	.14¼ - .14½

Fertilizers

Ammonium sulphate, bulk, f.o.b. works	100 lb.	[illegible] - $3.25
F.a.s. double bags	100 lb.	3.55 - 3.65
Blood, dried, bulk	unit	4.00 - ....
Bone, raw, 3 and 50, ground	ton	27.00 - 30.00
Fish scrap, dom., dried, wks.	unit	3.75 - ....
Nitrate of soda, bags	100 lb.	2.45 - 2.52½
Tankage, high grade, f.o.b. Chicago	unit	3.40 - 3.50
Phosphate rock, f.o.b. mines, Florida pebble, 68-72%	ton	$4.00 - $4.50
Tennessee, 78-80%	ton	8.00 - 8.25
Potassium muriate, 80%, bags	ton	34.55 - ....
Potassium sulphate, bags basis 90%	ton	43.67 - ....
Double manure salt	ton	25.72 - ....
Kainit	ton	7.22 - ....

Crude Rubber

Para—Upriver fine	lb.	$0.26½ - ....
Upriver coarse	lb.	.23 - ....
Upriver caucho ball	lb.	.24 - ....
Plantation—First latex crepe	lb.	.28½ - ....
Ribbed smoked sheets	lb.	.28¼ - ....
Brown crepe, thin, clean	lb.	.27 - ....
Amber crepe No. 1	lb.	.27¼ - ....

Gums

Copal, Congo, amber, bags	lb.	$0.12½ - $0.13½
East Indian, bold, bags	lb.	.23 - .23½
Manila, pale, bags	lb.	.20 - .20½
Pontinak, No. 1 bags	lb.	.20 - .20½
Damar, Batavia, cases	lb.	.27½ - .28
Singapore, No. 1, cases	lb.	.32 - .33
Singapore, No. 2, cases	lb.	.23½ - .24
Kauri, No. 1, cases	lb.	.68 - .70
Ordinary chips, cases	lb.	.22½ - .23½
Manjak, Barbados, bags	lb.	.09 - .09¼

Shellac

Shellac, orange fine, bags	lb.	$0.56 - $0.57
Orange superfine, bags	lb.	.58 - .59
A. C. garnet, bags	lb.	.58 - ....
Bleached, bonedry	lb.	.64 - ....
Bleached, fresh	lb.	.52 - ....
T. N., bags	lb.	.53 - .54

Miscellaneous Materials

Asbestos, crude No. 1, f.o.b., Quebec	sh. ton	$500.00 - ....
Asbestos, shingle, f.o.b., Quebec	sh. ton	$65.00 - $85.00
Asbestos, cement, f.o.b., Quebec	sh. ton	20.00 - 25.00
Barytes, grd., white, f.o.b. mills, bbl.	net ton	16.00 - 20.00
Barytes, grd., off-color, f.o.b. mills bulk	net ton	13.00 - 15.00
Barytes, floated, f.o.b. St. Louis, bbl.	net ton	28.00 - ....
Barytes, crude f.o.b. mines, bulk	net ton	10.00 - 11.00
Casein, bbl., tech.	lb.	.14 - .15
China clay (kaolin) crude, f.o.b. Ga.	net ton	7.00 - 9.00
Washed, f.o.b. Ga.	net ton	8.00 - 9.00
Powd., f.o.b. Ga.	net ton	14.00 - 20.00
Crude f.o.b. Va.	net ton	7.00 - 9.00
Ground, f.o.b. Va.	net ton	13.00 - 19.00
Imp., lump, bulk	net ton	15.00 - 20.00
Imp., powd.	net ton	45.00 - 50.00
Feldspar, No. 1 pottery	long ton	6.00 - 7.00
No. 2 pottery	long ton	4.00 - 5.50
No. 1 soap	long ton	7.00 - 7.50
No. 1 Canadian, f.o.b. mill	long ton	18.00 - 20.00
Graphite, Ceylon, lump, first quality, bbl.	lb.	.06½ - ....
Ceylon, chip, bbl.	lb.	.05½ - ....
High grade amorphous crude	ton	15.00 - 35.00
Gum arabic, amber, sorts, bags	lb.	.14½ - .15
Gum tragacanth, sorts, bags	lb.	.48 - .56
No. 1, bags	lb.	1.50 - 1.60
Kieselguhr, f.o.b. Cal.	ton	40.00 - 42.00
F.o.b. N. Y.	ton	50.00 - 55.00
Magnesite, crude, f.o.b. Cal.	ton	14.00 - 15.00
Pumice stone, imp., casks	lb.	.03 - .05½
Dom., lump, bbl.	lb.	.05 - .05½
Dom., ground, bbl.	lb.	.06 - .07
Silica, glass sand, f.o.b. Ind.	ton	2.00 - 2.50
Silica, sand blast, f.o.b. Ind.	ton	2.50 5.00
Silica, amorphous, 250-mesh, f.o.b. Ill.	ton	17.00 - 17.50
Silica, bldg. sand, f.o.b. Pa.	ton	2.00 - 2.75
Soapstone, coarse, f.o.b. Vt., bags	ton	7.00 - 8.00
Talc, 200 mesh, f.o.b., Vt., bags	ton	6.50 - 9.00
Talc, 200 mesh, f.o.b. Ga., bags	ton	7.00 - 9.00
Talc, 200 mesh, f.o.b. Los Angeles, bags	ton	18.00 - 20.00

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$2.75 - ....
Corning	bbl.	1.60 - ....
Cabell	bbl.	1.50 - ....
Somerset	bbl.	1.40 - ....
Illinois	bbl.	1.67 - ....
Indiana	bbl.	1.68 - ....
Kansas and Oklahoma, 28 deg.	bbl.	1.20 - ....
California, 35 deg. and up	bbl.	1.04 - ....

Gasoline, Etc.

Motor gasoline, steel bbls.	gal.	$0.20½ - ....
Naphtha, V. M. & P. deod, steel bbls.	gal.	.19½ - ....
Kerosene, ref. tank wagon	gal.	.14 - ....
Bulk, W. W. export	gal.	.06½ - ....
Lubricating oils:		
Cylinder, Penn., dark	gal.	.20 - .22
Bloomless, 30@31 grav.	gal.	.18½ - .20½
Paraffin, pale	gal.	.24 - .26
Spindle, 200, pale	gal.	.21 - .22
Petrolatum, amber, bbls.	lb.	.05 - .05¼
Paraffine wax (see waxes)		

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	ton	$45-50
Chrome brick, f.o.b. Eastern shipping points	ton	50-52
Chrome cement, 40-50% Cr_2O_3	ton	23-27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks.	1,000	40-46
2nd. quality, 9-in. shapes, f.o.b. wks.	1,000	36-41
Magnesite brick, 9-in. straight (f.o.b. wks.)	ton	65-68
9-in. arches, wedges and keys	ton	80-85
Scraps and splits	ton	85
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	48-50
Silica brick, 9-in. sizes, f.o.b. Birmingham district	1,000	48-50
F.o.b. Mt. Union, Pa.	1,000	42-44
Silicon carbide refract. brick, 9-in.	1,000	1,100.00

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls, N. Y.	ton	$200.00 - $225.00
Ferrochromium, per lb. of Cr, 6-8% C	lb.	.11½ .11½
4-6% C	lb.	.12 - .13
Ferromanganese, 78-82% Mn, Atlantic seabd. duty paid	gr. ton	117.50 - ....
Spiegeleisen, 19-21% Mn.	gr. ton	40.00 - ....
Ferromolybdenum, 50-60% Mo, per lb. Mo	lb.	2.00 - 2.50
Ferrosilicon, 10-15%	gr. ton	48.00 - 50.00
50%	gr. ton	95.00 - ....
75%	gr. ton	150.00 - 160.00

Ferrotungsten, 70-80%, per lb. of W	lb.	$0.88 –	$0.90
Ferro-uranium, 35-50% of U. per lb. of U	lb.	4.50 –	....
Ferrovanadium, 30-40%, per lb. of V	lb.	3.50 –	3.75

Ores and Semi-finished Products

Bauxite, dom. crushed dried, f.o.b. shipping points	ton	$6.00 –	$9.00
Chrome ore Calif. concentrates, 50% min. Cr_2O_3	ton	22.00 –	23.00
C.i.f. Atlantic seaboard	ton	20.50 –	24.00
Coke, fdry., f.o.b. ovens	ton	5.50 –	6.00
Coke, furnace, f.o.b. ovens	ton	4.75 –	5.00
Fluorspar, gravel, f.o.b. mines' Illinois	ton	23.50 –	.....
Ilmenite, 52% TiO_2	lb.	.01½–	.01¾
Manganese ore, 50% Mn c.i.f. Atlantic seaport	unit	.35 –	....
Manganese ore, chemica (MnO_2)	ton	80.00 –	85.00
Molybdenite, 85% MoS_2, per lb. MoS_2, N. Y.	lb.	.65 –	.70
Monazite, per unit of ThO_2, c.i.f., Atl. seaport	lb.	.06 –	.08
Pyrites, Span., fines, c.i.f. Atl. seaport	unit	.11½–	.12
Pyrites, Span., furnace size, c.i.f. Atl. seaport	unit	.11½–	.12
Pyrites, dom. fines, f.o.b. mines, Ga.	unit	.12	
Rutile, 95% TiO_2	lb.	.12 –	....
Tungsten, scheelite, 60% WO_3 and over, per unit WO_3	unit	8.50 –	8.75
Tungsten, wolframite, 60% WO_3 and over, per unit WO_3	unit	8.00 –	8.25
Uranium ore (carnotite) per lb. of U_3O_8	lb.	3.50 –	3.75
Uranium oxide, 96% per lb. U_3O_8	lb.	2.25 –	2.50
Vanadium pentoxide, 99%	lb.	12.00 –	14.00
Vanadium ore, per lb. V_2O_5	lb.	.75 –	1.00
Zircon, washed, iron free, f.o.b. Pablo, Fla.	lb.	.02½–	.10

Non-Ferrous Materials

	Cents per Lb
Copper, electrolytic	14⅜–...
Aluminum, 98 to 99%	26–27½
Antimony, wholesale, Chinese and Japanese	7– 7½
Nickel, virgin metal	27–29
Nickel, ingot and shot	30–32
Monel metal, shot and blocks	32.00
Monel metal, ingots	38.00
Monel metal, sheet bars	45.00
Tin, 5-ton lots, Straits	38.75
Lead, New York, spot	6.50
Lead, E. St. Louis, spot	6.35
Zinc, spot, New York	6.50
Zinc, spot, E. St. Louis	6.15

Other Metals

Silver (commercial)	oz.	$0.63
Cadmium	lb.	1.00
Bismuth (500 lb. lots)	lb.	2.55
Cobalt	lb.	3.00-3.25
Magnesium, ingots, 99%	lb.	1.25–.....
Platinum	oz.	116.00
Iridium	oz.	275.00@300.00
Palladium	oz.	80.00
Mercury	75 lb.	67.00

Finished Metal Products

	Warehouse Price Cents per Lb.
Copper sheets, hot rolled	23.75
Copper bottoms	30.50
Copper rods	23.50
High brass wire	20.00
High brass rods	18.00
Low brass wire	21.75
Low brass rods	22.00
Brazed brass tubing	24.25
Brazed bronze tubing	28.50
Seamless copper tubing	27.00
Seamless high brass tubing	25.50

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

Copper, heavy and crucible	10.25@10.50
Copper, heavy and wire	11.50@11.75
Copper, light and bottoms	10.25@10.50
Lead, heavy	5.00@ 5.25
Lead, tea	3.00@ 3.25
Brass, heavy	6.25@ 6.50
Brass, light	5.25@ 5.50
No. 1 yellow brass turnings	6.00@ 6.25
Zinc scrap	3.50@ 3.75

Structural Material

The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses in the cities named:

	New York	Chicago
Structural shapes	$3.64	$3.64
Soft steel bars	3.54	3.54
Soft steel bar shapes	3.54	3.54
Soft steel bands	4.39	4.39
Plates, ½ to 1 in. thick	3.64	3.64

Industrial

Financial, Construction and Manufacturing News

Construction and Operation

California

FULLERTON—The Clay Products Co. has acquired property on the Bastanchury ranch, about 1 mile from the city, as a site for a new plant for the manufacture of tile and other burned clay products. The initial unit will cost about $90,000, with machinery, and plans will be prepared at once. The company was organized recently with a capital of $125,000, and has established offices in the local California Hotel Bldg. George R. Whitcomb is president.

SAN DIEGO—The San Diego Oil Products Co. has acquired the cotton oil and cottonseed byproducts plant of the Goodyear Tire Co., at Phoenix, Ariz., and will take over the property for the establishment of a branch plant. Extensions and improvements are planned. C. H. Bencini is president.

LOS ANGELES—The Pacific Steel Corp., recently organized to consolidate a number of coast interests, has acquired a tract of 200 acres of land in the Terminal district and plans for the construction of a new mill to cost in excess of $5,000,000. It will consist of a number of buildings, with power house and will be equipped for an initial output of 600 tons of rolled steel daily. D. M. Reynolds, vice-president of the First National Bank of Los Angeles, is one of the heads of the company.

SAN DIEGO—The Vitrified Products Co. is making ready to construct the second unit of its new local plant for the manufacture of vitrified tile products, to cost in excess of $50,000, with machinery. The first unit is nearing completion and will be placed in service at an early date. George W. Kummer is general manager.

Colorado

PUEBLO—The Derby Oil & Refining Co., Wichita, Kan., has acquired a tract of local property as a site for the erection of a new oil storage and distributing plant, estimated to cost in excess of $75,000, with equipment.

Connecticut

WINDSOR LOCKS—C. H. Dexter & Sons, Inc., Canal St., manufacturer of paper products, has work under way on a new 4-story addition for extensive increase in production. The main floor will be equipped with beaters, washers and kindred equipment, while the floors above will be utilized for general operating service and storage.

Florida

HOMESTEAD — The Florida East Coast Fertilizer Co., Commercial Bank Bldg., Miami, Fla., has secured a local building and will install equipment for a new plant for the manufacture of a line of fertilizer products.

Illinois

CHICAGO—The Hofstra Mfg. Co., Tulsa, Okla., has leased a portion of the building at 4860 South Halstead St., for the establishment of a new branch plant for the manufacture of insecticides and insect powders. Immediate possession will be taken and equipment installed. J. Burr Gibbons is president.

CHICAGO—The Continental Paper Grading Co. is taking bids on a general contract for the rebuilding of the portion of its 1-story plant, 40x96 ft., at 1451-53 South Peoria St., recently damaged by fire. The work will cost about $23,000.

Indiana

BUFFINGTON — The Universal Portland Cement Co., Chicago, Ill. will commence the installation of a new dust precipitation system at its plant, with automatic collection and disposal, estimated to cost $450,000.

Kansas

TOPEKA — The Independent Lubricating Co., recently organized with a capital of $100,000, has acquired property at 13th St. and the line of the Santa Fe Railroad, and plans for the erection of a new plant for the production of lubricating oils. The initial works will cost approximately $40,000, with equipment. J. E. Longshore is one of the heads of the company.

Kentucky

LOUISVILLE — The Dosch Chemical Co., Bernheim Lane and 7th St., has tentative plans under consideration for the rebuilding of the portion of its plant destroyed by fire, July 11, with loss estimated at close to $200,000.

WEST IRVINE—Fire, July 17, destroyed a portion of the distributing plant of the Atlantic Oil Co., with loss estimated at about $150,000, including equipment. It is planned to rebuild.

Maryland

BALTIMORE—The Maryland Steel Rolling Co., organized under state laws and operating a plant at Trenton, N. J., is perfecting plans for the construction of a new steel mill on local site. It will consist of a number of buildings, with equipment to provide for an output of about 30,000 tons per annum. It is estimated to cost about $225,000, with machinery. H. S. Baldwin is general manager.

NORTH EAST—Fire, July 17, destroyed a portion of the plant of the Legore Lime Co., with loss estimated at $50,000, including equipment. It is planned to rebuild.

Massachusetts

BOSTON—Tileston & Hollingsworth, 898 River St., manufacturers of paper products, have completed plans for the erection of two new plant additions, both 1-story, consisting of a finishing department to cost approximately $50,000, and machine department, estimated to cost $15,000. Work will be placed in progress at once.

ACTON—The American Powder Co. is considering plans for the rebuilding of the portion of its plant destroyed by fire, July 14, with loss estimated at $25,000, the bulk of which represents equipment. The plant is located in Powder Mills Village, near Acton.

AMESBURY—The Amesbury & Salisbury Gas Co. is planning for the rebuilding of the portion of its artificial gas plant destroyed by fire, July 18, with loss estimated at $50,000.

Michigan

KALAMAZOO — The Kalamazoo Vegetable Parchment Co. has work in progress on a new paper mill to cost in excess of $2,000,000, including machinery. It will be operated in conjunction with the present works. The machinery installation will be rushed to completion and the new unit placed in service at the earliest date.

GRAND HAVEN — The Concrete Products Co., recently organized, plans for the operation of a local plant for the manufacture of a line of concrete and cement products. Grover Bendler heads the company.

KALAMAZOO—The Bryant Paper Co. has awarded a general contract to R. D. Boyer, Kalamazoo, for the construction of a 3-story converting plant, 46x160 ft., estimated to cost $40,000.

Missouri

ELSBERRY—The Crystal Carbonate Lime Co. has preliminary plans for the rebuilding of the portion of its mill, recently destroyed by fire. An official estimate of loss has not been announced.

Montana

SHELBY—The Campbell Oil Co. has plans under way for the construction of a new oil-refining plant on local site, and expects to break ground early in August. The initial plant will have a capacity of approximately 1,000 bbl. per day, and is estimated to cost close to $250,000.

New Jersey

BEVERLY—The Beverly Wall Paper Co. is having plans drawn for the construction of a new 1-story addition, 60x200 ft., for general increase in production. Harry G. Aitken, American Mechanics Bldg., Trenton, is architect.

RAHWAY—Fire, July 19, destroyed a portion of the plant of the Diamond Match Co., with loss estimated at $65,000, including equipment. It is planned to rebuild. Headquarters of the company are at 111 Broadway, New York.

WOODBRIDGE — The M. D. Valentine & Brothers Co., manufacturer of firebrick, plans for the immediate rebuilding of the portion of its clay-grinding and drying plant destroyed by fire July 16, with loss approximating $13,000.

New York

BROOKLYN—Samuel Wander, 440 Washington St., New York, manufacturer of chemical products, has completed plans and will soon commence work on a 2-story addition to his plant, 30x30 ft., at 89 Bridge St., Brooklyn. It is also purposed to make alterations and improvements in the existing works.

JOHNSTOWN — Herbert W. Topp, North Perry St., is considering plans for the rebuilding of his plant, devoted to the production of leather dressings and kindred specialties, recently partially destroyed by fire.

North Carolina

NEWBERN — The American Agricultural Chemical Co., 2 Rector St., New York, is perfecting plans for the resumption of operations at its fertilizer works at Newbern, and will arrange facilities for a production of more than 15,000 tons of fertilizer per annum. G. L. Lathan is local manager.

Oklahoma

HASKELL—The Coleman-Nelson Co., Tulsa, has acquired the local oil plant of the Southern Refining Co., and will convert the structure into a gasoline-refining plant. Additional equipment will be installed. The work will cost approximately $50,000.

TULSA—The Besse Sanitary Power Mfg. Co., 1809 South Qudnah St., manufacturer of insecticides, sanitary powders, etc., has plans for the construction of a new 2-story plant, 50x50 ft., with the installation of equipment to provide for an initial output of about 5,000 lb. per day. R. L. Cotman is secretary.

TULSA—The Bradbyer-Dunntile Mfg. Co., 17 South Zunis St., will soon break ground for the construction of a new 1-story plant, 100x100 ft., for the manufacture of composition tile products. It will cost about $15,000 exclusive of equipment. L. J. Campbell is secretary.

Pennsylvania

QUARRYVILLE—The Lancaster Bone Fertilizer Co., 605 Woolworth Bldg., Lancaster, Pa., H. W. Huff, in charge, has plans in preparation for the construction of a new 2-story plant, 60x80 ft., on site selected at Quarryville, for the manufacture of fertilizer products. It is expected to take bids in about 30 days. The works will cost about $22,000.

FLEETWOOD — The Reading Rubber Co., Kutztown, Pa., manufacturer of rubber tubes, etc., has leased a building at Fleetwood, for the establishment of a new plant. The structure will be remodeled and improved and a 1-story addition erected on adjoining site, with total cost placed at $100,000, including equipment. It is planned to remove the Kutztown mill to the new location. Samuel H. Bell, Reading, is president.

CORAOPOLIS—The Vulcan Oil Refining Co. will soon commence the rebuilding of the portion of its byproducts plant, including wax works, recently destroyed by fire. An official estimate of cost has not been announced. J. W. McAllister is company architect.

Tennessee

MEMPHIS—The Indiana Board & Filler Co., Vincennes, Ind., has preliminary plans in progress for the construction of a new pulp mill at its plant on Thomas St., Memphis, comprising the former works of the Tennessee Fibre Co., recently acquired. The new mill will be equipped for the manufacture of strawboard and kindred products, and will have an initial output of about 35 tons a day. Employment will be given to about 150 operatives. The new plant, with machinery, will cost approximately $500,000.

KNOXVILLE—The Paint Pigment Co. of America, Inc., has perfected plans for the establishment of a local plant for the production of paint pigments from iron ore. Machinery will soon be installed. Max Grant is president.

Texas

BRECKENRIDGE—The Thermatomic Carbon Co., Sterlington, La., has acquired a tract of local property, aggregating about 60 acres, and plans for the erection of a helium manufacturing plant estimated to cost in excess of $200,000, with equipment.

FORT WORTH — The Trinity Portland Cement Co., Dallas, has purchased a tract of land near Fort Worth, approximating 600 acres, as a site for the construction of a new cement-manufacturing plant, to consist of a number of buildings with power house, estimated to cost in excess of $1,000,000, with machinery. It is purposed to develop an initial output of 2,500 bbl. per day, and this will be increased at a later date. Plans will soon be prepared. The company is now operating a mill at Dallas, rated at 4,500 bbl. daily, and this plant will be maintained in service. H. L. McCourtie is president, and C. D. E. Ulrickson, vice-president and general manager.

GORDON—The Lone Star Gas Co., Eastland, will break ground at once for its proposed gasoline refining plant on local site, recently acquired. The initial plans have been revised to provide for a plant to cost close to $1,000,000 with machinery. It is expected to have the first unit ready for service at an early date.

New Companies

CARRIER-STEPHENS Co., Lansing, Mich.; chemicals and chemical byproducts; $100,000. Incorporators: J. Edward Roe, M. R. Carrier and Ransom E. Old, 720 South Washington St., Lansing.

DUNBAR FLINT GLASS CORP., Dunbar, W. Va.; glass products; $125,000. Incorporators: J. M. Payne, Jr., Dunbar; C. P. Miller and John B. Ray, both of Charleston, W. Va.

LOGAN-ROBINSON FERTILIZER Co., Atlanta, Ga.; fertilizer products; $100,000. Incorporators: John W. Robinson, Atlanta; W. Hampton Logan and John I. Cosgrove, both of Charleston, S. C. Representative: United States Corporation Co., Dover, Del.

ESPERANZA OIL CORP., Laredo, Tex.; petroleum products; $49,000. Incorporators: F. W. Tong, L. B. Flick, and H. P. Coupe, all of Laredo.

KARL-O-SPRAY INSECTIDE Co., 74 Monmouth St., Newark, N. J.; chemical products and insecticides; organized. Joseph Karlins, 55 Huntington Terrace, heads the company.

ACME CARBON MFG. Co., Monroe, La.; carbon black, etc.; $750,000. Incorporators: W. E. Allen, L. N. Larche and H. B. Montgomery, all of Monroe. Representative: Corporation Service Co., Equitable Bldg., Wilmington, Del.

OTAKA PAPER Co., Fall River, Mass.; paper products; $200,000. Incorporators: Penrose R. Hoopes, William A. Lorenz, Hartford, Conn.; and James E. Lyons, Fall River. Representative: United States Corporation Co., Dover, Del.

AMMONITE Co., New York, N. Y.; chemicals and chemical byproducts; $55,000. Incorporators: H. N. Shreve, W. Schmidtmann, and W. P. Ten Eyck. Representative: F. J. Knorr, attorney, Albany, N. Y.

TIN-A LABORATORIES, INC., 800 Broad St., Newark, N. J.; chemicals and chemical byproducts; $50,000. Incorporators: S. M. Lewitt and J. Jerome Kaplon.

BALTIC GASOLINE Co., 1063 Calvert Bldg., Baltimore, Md.; refined petroleum products; gasoline, etc.; $211,000. Incorporators: S. C. Schey and William L. Henderson.

NORTHWESTERN PIKE LIME Co., Tunnelton, W. Va.; lime products; organized. M. M. Bolyard, Newberg, W. Va., and J. Wedley Shaffer, Tunnelton.

KETTLE RIVER TREATING Co., Madison, Ill.; creosote oils, tars, compounds, etc.; $750,000. Incorporators: E. A. Nixon, Edward J. Engelman and R. E. Kneeland. Registered office, 905 Syndicate Trust Bldg., St. Louis, Mo.

M. B. W. OIL Co., Canton, O.; refined oil products; $50,000. Incorporators: R. J. Van Nostran and G. Kellogg, both of Canton.

FASTICK PAINT CORP., Jersey City, N. J.; paints, varnishes, etc.; $100,000. Incorporators: Charles R. Dunwoody and Peter DeRosa, 146 Ocean Ave., Jersey City. The last noted is representative.

TOSCANIS SUPERIOR LEATHER CORP., New York, N. Y.; leather products, tanning, etc.; $20,000. Incorporators: J. and A. Toscani. Representative: H. E. Goldsmith, 105 West 40th St., New York.

AMERICAN MAGNESIA CEMENT CORP., Philadelphia, Pa.; cement products; $250,000. Representative: Corporation Guarantee & Trust Co., Land Title Bldg., Philadelphia.

TULEKO RUBBER Co., 61 Belleville Ave., Belleville, N. J.; rubber products; organized. Charles W. Leehel, 105 Ferguson St., heads the company.

ROWE DANIEL PETROLEUM Co., New York, N. Y.; refined petroleum products; $3,000,000. Representative: United States Corporation Co., 65 Cedar St., New York.

GUADALUPE PORTLAND CEMENT Co., San Francisco, Calif.; construct and operate cement mills; $3,000,000. Incorporators: Frederick G. Cartwright, Robert Dunlay and Leo J. Pope. Representative: Boswell F. King, Humboldt Bank Bldg., San Francisco.

DIE-CAST FIBER CORP., 33 North Genesee St., Waukegan, Ill.; fiber products; $11,500. Representative: Sonnenschein, Berkson, Lautmann and Levinson, Chicago Temple Bldg., Chicago.

FISK FLAP TUBE RUBBER Co., Trenton, N. J.; rubber products; $500,000. Incorporators: George Wiley, M. A. and A. F. Wendel. Representative: Paul H. Wendel, 17 East State St., Trenton.

STANDARD ALUMINUM CASTINGS CORP., Lansing, Mich.; aluminum and other metal castings; $10,000. Incorporators: John G. Krishum and Louis Simon, 209 West Saginaw St., Lansing. The last noted is representative.

Industrial Notes

THE ORTON & STEINBRENNER Co., Chicago, Ill., manufacturer of locomotive cranes, dipper shovels and grab buckets, announces a reorganization of the company and the election of the following officers: P. A. Orton, president and general manager; E. B. Ayres, vice-president; Herbert Mertz, secretary and sales manager; Harry Shaffer, treasurer and purchasing agent; G. L. Niederst, chief engineer, and Alex Orton, works manager. No change in the management, control or policy has been made, nor is any contemplated. The reorganization is occasioned only by the resignation of H. G. Steinbrenner as president and the disposal of his interest in the company.

THE TERNSTEDT MFG. Co., Detroit, Mich., announces that it has taken over the Shepard Art Metal Co. of the same city, and in the future this business will be operated as the Ternstedt Manufacturing Co., Shepard Art Metal Division. The amalgamation of these companies will greatly facilitate taking care of customers. All invoicing, purchasing, etc., will be handled by the main office of the Ternstedt Manufacturing Co.

THE PITTSBURGH TESTING LAB., Pittsburgh, Pa., announces the appointment of F. H. Rood as engineer of tests, with headquarters at Pittsburgh.

THE AMERICAN NICKEL CORP., to insure closer co-operation between the sales and manufacturing departments, has discontinued its Pittsburgh sales office, and has moved its entire sales organization to the main office and plant at Clearfield, Pa.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

CHEMICALS, toilet requisites, powders, etc. Johannesburg, South Africa. Exclusive agency.—7258.

LEAD, white and red. Goteborg, Sweden. Purchase.—7279.

NAVAL STORES, paints and varnishes. Johannesburg, South Africa. Exclusive agency.—7254.

PAINTS, house. Fort de France, Martinique. Purchase and agency.—7268.

SODIUM NITRATE. Vienna, Austria. Purchase.—7243.